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Labour productivity and technical equipment supply in new EU member countries

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Labour and capital productivity are essential conditions of competitive production. After accession to the European Union, conditions of competition in agriculture in the Central and Eastern European countries have changed. It is a great challenge for the producers to hold against the competitors with a higher productivity, even on their own former markets. Based on the partial efficiency theory, the study analyses the productivity of the region's agriculture and its response to the new market challenges as well as messages given by the development subsidies to the farmers from the aspects of productivity and real investments.

Key words: partial efficiency, competitiveness, agriculture, Central and Eastern European countries, technical development

INTRODUCTION

Central and Eastern European agriculture – integrated in the agriculture of the European Union and competing with the farms of member countries – faces the challenge of the changed social-economic environment of production. The requirements on the quality of food products, the widespread implementation of safe food production technologies, the development and maintenance of healthy and aesthetic environment will all be essential parts of agricultural production strategies. The changes demand new responses and innovative behaviour from farmers. One of the possible means is technical development.

The target system of agricultural technical development, based on the foundations that were laid down in the previous decades, is constantly changing, improving and involving all the achievements and experiences of social-economic development. The development is not unbroken, because the social processes in the Central and Eastern European region have resulted in a new ownership (estate) and farm structure in agriculture, based on new principles. The development of the new farm structure requires a new approach from farmers, professional-scientific staff and government officers.

The subsidies from state budget sources have a specific, highlighted role within the means of agricultural development. The efficient utilisation of these subsidies is the interest of national economy. To measure the efficiency of subsidies is not an easy task, because the joint consideration of direct (measurable) and indirect (not measurable or disputably estimable) social benefits can give a realistic picture of the returns of community expenditures.

The considerations of decision-makers in economic policy and the priorities based on these considerations are often different from the aspects and priorities of researchers who think of only professional and economic principles. The former are dominated by short-term interests, while the latter by strategic considerations. It is, however, the possibility and responsibility of researchers to look further in advance and, irrespective of the actual pressures, compose the "Utopia" of their special field, scrutinizing both the past and the present and describing an ideal future based on scientific metholodogy.

The dynamic system of economic social development is part of the permanent "change–impact–response" cycle (Láng, 2006). Each response also generates a new change. From the economic-social changes of Europe in the 20th century, this cyclical development could be observed primarily in the second half of that century and in the years following the turn of the millennium.

In the Central and Eastern European countries, the political–economic–social changeover meant, on the one hand, the integration into the market economy system. On the other hand, however, as regards the agricultural economy, instead of opening to market economy, the adaptation and systematic implementation of the European subsidy system could be seen after the EU integration of most of the transformed countries.

Concerning agriculture, in most of the Eastern and Central European countries, the social-economic changeover

has brought – besides shifting ownership – farm structure changes and the diversification of the estate system. The countries carried out this shift in their ownership structure differently (Takács-György, Sadowski, 2005). Some typical features of different responses are outlined below. For example, in East German (former GDR) provinces, large estates remained prevailing, which can partly be justified by the historical background itself (the Prussian large estate system was typical of the region before the 2nd World War). In Slovakia, the privatization of cooperatives was carried out without returning estates or compensating on a historical basis, which resulted in the large-scale farms maintaining their decisive share in the estate structure (Takács-György et al., 2008). In the Baltic states, the social change over liquidated the farm structure of the former kolhoz and sovhoz system, privatized and diversified the land ownership, but the pace of privatization was different. In Lithuania, only 66% of the land had gone to private ownership until 2004, while in Latvia, the privatization process had actually been finished. In Estonia, the role of corporate entreprises became significant; they cultivated 44.3% of the land in 418 ha average size units in 2005. In Poland, there were no significant changes, because – only here among the countries of the region – the so-called "socialist restructuring" of agriculture had not been carried out in the former decades, and the dominance of private ownership based on small and minor farms remained in that era (Sadowski, Takács-György, 2005).

Following the changeover, the new ownership and estate structure was divided. The gap between the two parts is well characterized by the high proportion of land leasing, which means significant costs for the farmers and contributes greatly to the leakage of agricultural subsidies. According to the calculations made in the Hungarian Research Institute of Agricultural Economics, the degree of leaking in different channels amounts to 50% in Hungary, out of which the share of land owners is 32%. International data give even higher estimations (Kovács et al., 2008). The direct subsidies are suitable for improving the income positions of farmers (Baranyai, 2008), but only large-scale farms can accumulate appropriate volumes of capital for the foundation of development (Belovecz, Baranyai, 2008).

As regards the productivity of live labour in crop production, the proportion of part-time farms can be high in the smallest economic size unit category. That's why the productivity index is higher in this category than in the medium-size farms. The natural productivity index of live labour in Hungary is above the average of the European Union in most of the size categories (Takács et al., 2008).

The capacities created by mechanisation helped to decrease live labour need. During 15 years (from 1989 to 2004), in the former member countries of the EU, the labour capacity of about 2.2 million people had become redundant with an increasing output in natural and gross production value. The live labour utilisation has been decreasing ever since then, and this tendency can be observed in the newly accessed countries, too.

The farm structure has been shifted to the medium and large-scale farms by farm concentration according to the economic size unit (Takács et al., 2008).

In the farm structure of reconstructed agriculture, the mechanisation meant a new challenge for the farmers (Magó, 2007).

The competitiveness of Central and Eastern European farms depends very much on their efficiency, which can partly be indicated with natural efficiency and partly by the efficiency of machine use, or capital embodied in machinery. In the years following the social changeover, Hungarian agriculture slipped back from its former high rank concerning many indices, but this move was significantly different in the different sectors and farms (Varga, 2006a). The expenditures of Hungarian agricultural producers are below the level of EU countries with developed agriculture, and the yields are even more behind those.

One of the most widespread methods of examining the efficiency of technical development is the calculation of partical efficiency, where changes of live labour productivity (y/L) are determined in relation to equipment supply and capital productivity as the product of capital productivity (y/K) and technical equipment (K/L):

$$\frac{y}{L}=\frac{y}{K}\cdot\frac{K}{L}. \tag{1}$$

The inter-company or international comparison of partial efficiency index shows how the productivity differences can be led back to the differences in capital productivity and capital supply (in capital supply per head or the equipment supply embodying the capital) (Szűcs, Farkasné Fekete, 2008).

Changes in equipment and the capital embodied in them result from a complicated process. Information about the changes of factors is obtained in an empirical way: we could see that as a result of technical progress, the production potential of the biological basis (varieties involved in production) has been increasing in the recent decades. This objective is served – in addition to traditional breeding tools – by biotechnology, too; the chemical background of production has been dynamically improving, there are a lot of new processes to enhance the utilisation of nutrients, a lot of new materials serving to meet the microelement demand of plants and animals. Criteria of environmental protection are also more and more observed, the quantities of herbicides to be spread are decreasing, new technologies and the related high-performance machines have appeared (e. g. precision farming) (Barkaszi, Takács-György, 2007; Takács-György, 2007). The technical development tries to serve the concept of sustainable development.

The Central and Eastern European governments gave different responses at different times to the new situation. The response of Hungarian government was the construction

Table 1. **Estimated capacity use, reflected in nominal performance, according to a survey made in 2002, in relation to size unit (%)**

Country	Less than 30 ha	30.1–60 ha	60.1–100 ha	100.1–200 ha	Over 200 ha	Average of all farms
Hungary	26	33	47	38	82	50
Poland	29	47	n. a.	n. a.	34	35

Source: Takács, Bojar, 2003.

of a new subsidy system in 1992. The development subsidies in the framework of the system missed the long-term concept, they served extensive development according to short-term interests: the growth of quantity capacity was not paired with modernity and quality criteria, the technological level of the sector was "widened", the low performance machines – appropriate for the typical plot and farm size – became determinant in farm investments. The result was that the agricultural machine capacities have almost doubled in 15 years, which has improved the equipment supply of farms but, considering the whole sector, the equipment efficiency has significantly deteriorated. Equipment use on small-scale farms is most wasteful (Table 1) (Takács, Bojar, 2003). The existence and effect of the subsidy system is obviously positive, but it should be noted that it has some additional impacts which indicate efficiency problems in the economic sense. It can be stated that the investment subsidies do not stimulate the development of efficient forms of capital use and the introduction of efficient forms of cooperation according to foreign exeriences (Baranyai, 2008).

The statements are also supported by the research of Vizdák who has examined the Northern Great Plain region in Hungary and found that there is a considerable dispersion in the equipment supply of farms, and the regional disproportions (between and within minor regions) are huge (Vizdák, 2004).

For all these reasons, the assessment of technical development and the subsidies to stimulate the development is a very complicated task which should go well beyond the competency of economics.

The objective of the study is to give a picture on the basis of the partial efficiency methodology concerning changes of capital efficiency in the European Union, positioning the situation of Central and Eastern European countries in the 2000s, and to offer solutions for improving capital productivity and the efficiency of subsidization.

The key to success in Central and Eastern European agriculture, in my opinion, is to channel the farmers' creativity not only into the maximisation of obtaining advantages, but also into the efficient – and socially optimal – use of these advantages.

MATERIALS AND METHODS

The data used in the research are taken from the EUROSTAT and FADN databases of the European Union.

The study period is 1989 to 2006. Data for the analysis were available for 12 countries until 1994, 15 countries until 2003, then 25 countries from 2004, arranged in 6 groups according to economic size units (ESU) (on the basis of the methodology used in the European Union: (1) 0 – <4 ESU, (2) 4 – <8 ESU, (3) 8 – <16 ESU, (4) 16 – <40 ESU, (5) 40 – <100 ESU, (6) ≥ 100 ESU). Out of the 152 standard variables in the database, the following variables were used for the research: the number of represented farms, average workforce utilisation, average area used, total output, total assets, invested assets, out of them machinery; 12950 data per variable were available for examination.

The efficiency is a general concept. The economic efficiency can be defined from different approaches, but the productivity indices are used primarily for its evaluation. Productivity means the yield (product quantity, output) produced with one resource unit:

$$\text{Effectiveness / productivity} = \frac{\text{output}}{\text{input}} \text{ or } \frac{\text{input}}{\text{output}}, \qquad (2)$$

where outputs are yields (t/ha), production value (c. u. / ha), collateral contribution (c. u. / ha);
inputs are area (ha), capital value of production means (c. u).

Examination of partial efficiency

The analysis of partial efficiency was made on the basis of relation (1) for the EU-12 / 15 / 25 countries. The relation is

$$\frac{y}{L} = \frac{y}{K} \cdot \frac{K}{L}, \qquad (3)$$

where:

$\frac{y}{L}$ = live labour productivity (money unit / annual workforce unit) (EUR / AWU),

$\frac{y}{K}$ = capital productivity (money unit / money unit) (EUR / EUR),

$\frac{K}{L}$ = technical equipment (money unit / annual workforce unit) (EUR / AWU).

The following variables were used from the FADN database for the calculation of partial efficiency:

- gross production value (SE131 – total output – c. u. in the database),
- total annual labour input (SE010 – total labour input – AWU in the database),
- value of machinery assets (SE455 – machinery – c. u. in the database).

Note: the machinery assets variable is used instead of fixed assets (SE441 – total fixed assets – c. u.) variable

because in some countries the value of land and quotas (SE446 – land, perman. crops & quotas – c. u.) has a significant share in fixed assets, which would significantly distort the results of examination of asset capital efficiency (Table 2).

The isoproductivity curves help to identify the internal components of productivity changes in the graphics.

The classification of countries was made on the basis of the given capital productivity and asset supply indices and also on the basis of their deviation from the centre (the average of the European Union).

The countries were divided into four groups on the basis of the deviation from the EU average in relation to asset supply and capital efficiency. The group identification number in the marking is determined by the order made according to the counterclockwise advance in the coordinate system. The features of the groups are summarized in Table 3.

In the research, I analysed the impact of changes of the factors. I used the progress following the examination method which describes the changes in their process, the relations in their dynamics and development, contrary to static examinations (Nábrádi, Ficzere Nagymihály, 2008). The condition of analysis is, on the one hand, the existence of a homogeneous time row, and, on the other hand, the identification marks of analysed units, which help to reliably identify the data of units at the consecutive dates. The point in the method is that the size categories are defined on the basis of a full-range data stock of the index to be analysed. These size categories are put in the same way in the head and side columns of the table for examination. The units – following the identification – are listed in the cells of the table according to their analysis value in the examined period t (side column) and period $t + 1$ (head column). Thus, these units are in the diagonal of the table, which had the same analysis factor in the examined date t and date $t + 1$. Those units are above the diagonal of the Table, where the size of the analysed factor increased from date t to date $t + 1$, and those are below the diagonal, where the size of the factor decreased (Table 4).

Table 2. **The proportion and distribution of invested assets in EU countries in 2006 (%)**

Country	Number of represented farms	Rate of total fixed assets in total assets	Rate of land, permanent crops and quotas in total fixed assets	Rate of buildings in total fixed assets	Rate of machinery in total fixed assets	Rate of breeding livestock in total fixed assets
Code in FADN	SYS02	SE-441	SE-446	SE-450	SE-455	SE-460
EU-15						
Mean	213169	76.4	59.5	21.3	14.0	5.3
Minimum	1710	31.5	28	4.4	2.2	2
Maximum	748570	95.9	90.9	56.5	29.4	15.7
Standard deviation	255639	18.8	19.7	15.0	7.2	4.0
New members (Central and Eastern European countries)						
Mean	98046	71.25	34.89	35	24.78	5.34
Minimum	1380	45.1	3.6	5.8	8.6	2.4
Maximum	757240	96.2	83.3	80.9	43.2	8.7
Standard deviation	232979	18.0	23.9	20.3	12.9	2.0

Source: our own construction on the basis of FADN.

Table 3. **Features of groups in relation to asset supply and capital productivity, positioned on the basis of their deviation from the European Union average**

Group mark	Description of group features	Description of group	Angle range in Descartes coordinate system
G1	Countries with asset supply and capital efficiency above the average	Clever rich	$\gamma_i = (0;\ \frac{\pi}{2})$
G2	Countries with asset supply below the average, but capital efficiency above the average	Clever poor	$\gamma_i = (\frac{\pi}{2};\ \pi)$
G3	Countries with asset supply below the average and capital efficiency below the average	Wasting poor	$\gamma_i = (\pi;\ \frac{3\pi}{2})$
G4	Countries with asset supply above the average, but capital efficiency below the average	Wasting rich	$\gamma_i = (\frac{3\pi}{2};\ \pi)$

Source: our own construction on the basis of FADN.

Table 4. **Scheme of progress following examination**

			Criterion				To date t		
			x_1^{t+1}	x_2^{t+1}	…	x_n^{t+1}			
			Analysis value				Z_t	Proportion of change	
Criterion	x_1^t	Analysis value	$z_{1;1}$	$z_{2;1}$	…	$z_{n;1}$	$\Sigma z_{i;1}$	$\Sigma z_{i;1} - z_{1;1}$	$\frac{\Sigma z_{i;1} - z_{1;1}}{z_{1;1}}$
	x_2^t		$z_{1;2}$	$z_{2;2}$	…	$z_{n;2}$	$\Sigma z_{i;2}$	$\Sigma z_{i;2} - z_{2;2}$	$\frac{\Sigma z_{i;2} - z_{2;2}}{z_{2;2}}$
	…		…	…	…	…	…	…	…
	x_n^t		$z_{1;n}$	$z_{2;n}$	…	$z_{n;n}$	$\Sigma z_{i;n}$	$\Sigma z_{i;n} - z_{n;n}$	$\frac{\Sigma z_{i;n} - z_{n;n}}{z_{n;n}}$
To date $t+1$		Z_{t+1}	$\Sigma z_{1;i}$	$\Sigma z_{2;i}$	…	$\Sigma z_{n;i}$			
		Proportion of change	$\Sigma z_{1;i} - z_{1;1}$	$\Sigma z_{2;i} - z_{2;2}$	…	$\Sigma z_{n;i} - z_{n;n}$			
			$\frac{\Sigma z_{1;i} - z_{1;1}}{z_{1;1}}$	$\frac{\Sigma z_{2;i} - z_{2;2}}{z_{2;2}}$	…	$\frac{\Sigma z_{n;i} - z_{n;}}{z_{n;n}}$			

Source: our own construction on the basis of Nábrádi, Ficzere Nagymihály (2008).

RESULTS AND DISCUSSION

The average level of technical equipment was high and permanently increasing in farms of the European Union (Fig. 1). The technical equipment of smaller farms and large-scale farms is significantly better than in the other size groups, which raises asset efficiency problems, i. e. the production output produced with one unit of assets is lower than the average.

Analysis of changes of live labour productivity shows that the value of the index almost doubled concerning the whole European Union, but the enlargement in 2004 broke the dynamic development. The development had been extensive for a while, due to the increasing asset supply, but the capital productivity was deteriorating. This trend has turned back from 1999, and not only the increasing asset supply, but also the improving capital productivity contributed to the growth of live labour productivity. The reason for the break in 2004 is well demonstrated by the situation of the EU-10 average, which shows a considerably lower asset supply and a considerably lower capital productivity. The asset supply level corresponds to the level of 1989 for the EU-12; the value of capital productivity was never so low in the average of the former member countries as the average of the newly integrated countries (Fig. 1).

The period between 1989–2006 can be divided into five phases, which can be characterized as follows:

(a) 1989–1991: capital productivity dynamically increased besides a small rise of asset supply. The live labour productivity increased to a smaller degree (by approx. 1000 EUR / head, 5%);

(b) 1992–1998: besides the intensive growth of asset supply, the capital productivity significantly decreased; the live labour productivity rose considerably (by about 3500 EUR / head, 15%);

(c) 1999–2003: the asset supply increased at almost the same pace, the capital productivity had an improving tendency; the live labour productivity increased considerably (by about 13500 EUR / head, to half as much);

(d) 2004–2005: the period can be characterized with a decreasing asset supply, beside a continuing improvement of capital productivity; the newly integrated countries, which were mechanized typically at a lower level, have a significantly lower average capital productivity, and their asset supply is well below the average of the former member countries; the live labour productivity is 16000 EUR / head; the average live labour productivity in the EU significantly decreased (by about 10000 EUR / head, 25%); the live labour productivity of the former member countries did not change considerably in this period (remained at 42000 EUR / head).

(e) 2006: the decline of asset supply stopped, the capital productivity deteriorated again.

The live labour productivity of member countries shows a great dispersion. The productivity centre calculated in the average of the Central Eastern European countries (14000–16000 EUR / AWU) is well below – one third of – the average of the EU-15 (46000–50000 EUR / AWU), which is very worrying.

Analysing the position of some Central Eastern European countries, it can be stated that the situation of the Czech Republic and Hungary is relatively good because their live labour productivity is close to the EU average (they are close to the same isoquant), but the latter could reach a bit higher capital productivity with a lower asset supply. Slovakia can show up a high capital productivity (3–3.5 EUR / EUR), but, due to the low asset supply level, the live labour productivity

is lower by 5000–8000 EUR/AWU (20–25%) than in the above-mentioned countries. The Baltic states and Poland are in the same group with a 10000–15000 EUR/AWU live labour productivity. It is obvious that Polish agriculture, which is of great account, determines the central point of the Central and Eastern European country group.

The classification of member countries and farm types was made on the basis of partial efficiency indices (Fig. 2, Table 5). I classed the countries into four groups on the basis of their deviation from the EU average. G1 countries: countries with asset supply and capital efficiency above the average (clever rich) (Germany, Belgium, the Netherlands); G4 countries: countries with asset supply above the average, but capital efficiency below the average (wasting rich) (Luxembourg, Austria, Finland, Sweden, Czech Republic and Italy); there are countries on the border of the two groups (Ireland,

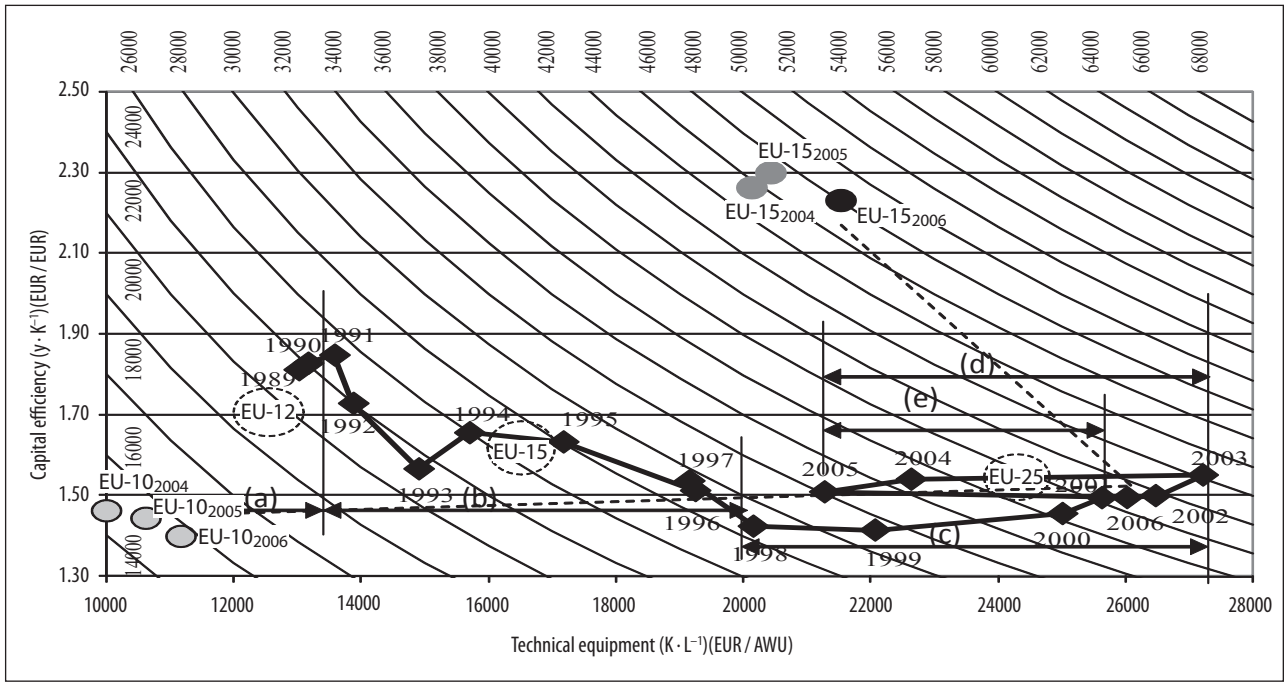

Fig. 1. Capital productivity and asset supply in the European Union agriculture (1989–2006)
Source: our own construction on the basis of FADN.

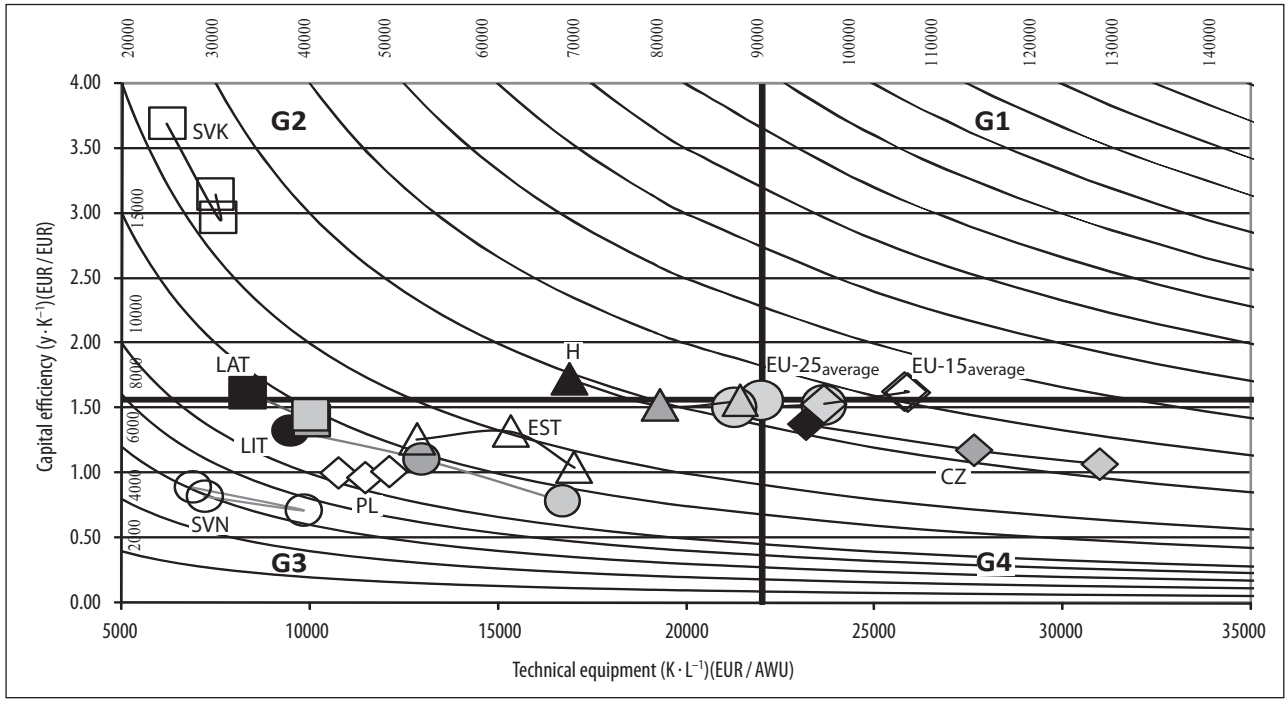

Fig. 2. Classification of EU-25 countries in relation to partial efficiency (technical equipment and capital efficiency) (2006)
Source: our own construction on the basis of FADN.

Table 5. **Progress analysis of partial capital efficiency of total capital in EU-15 countries (1995 / 2000 / 2006)**

Group	G1	G2	G3	G4	2000	Group	G1	G2	G3	G4	2006
G1	BEL, DAN			NED	3	G1	BEL			DAN	2
G2		FRA, UKI			2	G2	UKI	FRA ***SVK, HUN***	SUO		3 + ***2***
G3		SUO	ELL, ESP, IRE, POR	ITA	6	G3			ELL, ESP, POR ***LIT, EST, POL, SVN***	IRE, OST	5 + ***4***
G4			OST	DEU, LUX, SVE	4	G4				DEU, ITA, NED, LUX, SVE ***CZE***	5 + ***1***
1995	2	3	5	5	15	2000	2	1 + ***2***	4 + ***4***	8 + ***1***	15

Source: our own construction on the basis of FADN.

Note: Letters and figures in italics show the position of CEE counties in 2006.

France, United Kingdom and Denmark); G2: countries with asset supply below the average and capital efficiency above the average (clever poor) (Spain, Slovakia and Latvia); G3 and the other 7 are countries with asset supply below the average and capital efficiency below the average (wasting poor). The Baltic states and Hungary are on the crossline of the two groups; their position, however, is rather advantageous, becase they can reposition themselves to the group of clever poor by increasing their capital productivity (asset efficiency).

In the comparison by farm types, horticulture, grazing livestock production and plantation farms show a good performance. The situation of dairy farms is bad, but the fieldcrop farms are typically well mechanised, although they utilise their assets with a capital efficiency below the average. Examining the capital input in three levels (machine, material assets, total assets), the movements among the efficiency groups due to asset structure were obvious.

It has been determined from the progress analysis of the countries (Table 5) that the capital productivity of the Netherlands and Finland had been deteriorating so much between 1995–2000 that they dropped below the average of the country group. The asset supply of Austria declined, while that of Italy improved. In 2000–2006, the capital productivity of Denmark declined while, the asset supply of the United Kingdom improved. In Finland, both the capital productivity and the asset supply decreased. The relative asset supply of Ireland and Austria improved to a degree that they changed groups. The change analysis of Central and Eastern European countries was not possible due to the shortness of time, but the table shows their positions in 2006.

CONCLUSIONS

The European Union – as regards agriculture – is a community of countries with differently developed agriculture. During the recent decades, significant resources have been spent on the technical development of the sector through the agricultural policies of the European Union and the nations. The result of the process is that the technical supply has increased in many countries, and their indices of technical equipment (asset supply) have very high values. On the basis of the above, the following final conclusions can be made:

- the production in a group of the countries (in most of the former member countries) is made with a high input which contributes to the more balanced production, but its cost impact is also considerable and exerts a negative effect on their competitiveness;
- by forming efficiency groups, it can be stated that the dominance of the wasting poor (countries with asset supply below the average, using their capital fixed in assets with a typically low efficiency) is significant (almost half of the member countries belong to this group and most of them come from the newly integrated countries);
- in this comparison, the agriculture of the Central and Eastern European countries belongs to those which are at competitive disadvantage. Hungary made an extensive development (capacity increasing with a significant capital use) in the preparation decade, it had climbed back to the former level (of the 1980s) concerning its output which today is below the level of the most developed and even of some of the medium developed countries;
- the countries of the region have some chance to become competitive, if they can make a virtue of their poverty, which means that they produce on a lower asset supply level with a high capital productivity. That would put a lower specific capital cost per product unit. The different forms of cooperation among farmers can ensure an appropriate framework to achieve this objective.

Whenever there is an excess capacity accumulated on any farms, different types of cooperation of small and medium-size farms could be a way to increase the efficiency, especially in the countries of the G3 and G4 groups. Specific operating costs can be diminished by increasing the utilization of the capacity of assets the farms already possess, in

order to increase the competitiveness of these farms. Magó (2008) concluded the following: machinery with a low investment and operation costs should be planned in order to ensure an efficient machine use and improve capital efficiency in small and medium-size farms (Magó, 2008).

According to Varga (2006b), EU farms produce twice as much value on the same area with half as much expenditure than do Hungarian farms. It means a significant inefficiency and thus a competitive disadvantage for the farmers, which occur primarily due to management problems. The result of my own research shows that the reasons for the problems mentioned above are rather the efficiency problems of thechnical assets.

The study gives a picture on the basis of partial efficiency methodology about changes of capital efficiency in the European Union, positioning the situation of Central and Eastern European countries in the 2000s, and offers solutions for improving capital productivity and the efficiency of subsidization. The results have confirmed that these countires have efficiency disadvantages which could be decreased by different forms of cooperation among farmers (i. e. machinery rings, machinery cooperatives, networks of machine-work service entrepreneurs, etc.).

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NAUJŲJŲ ES VALSTYBIŲ NARIŲ ŽEMĖS ŪKIO SEKTORIAUS DARBO NAŠUMAS IR TECHNINĖ PAŽANGA INVESTICIJŲ POŽIŪRIU

S a n t r a u k a

Darbo našumas yra viena svarbiausių sąlygų konkurencinėje gamyboje. Įstojus į Europos Sąjungą žemės ūkio konkurencinės sąlygos Vidurio ir Rytų Europos šalyse pasikeitė. Gamintojams buvo tikras išbandymas atsilaikyti prieš konkurentus netgi buvusiose savo rinkose. Naudojantis dalinio efektyvumo teorija, buvo analizuojamas ir vertinamas žemės ūkio darbo ir kapitalo našumas regione ir jo reakcija į naujus rinkos iššūkius bei teikiamą paramą ūkininkams faktinėms investicijoms.

Raktažodžiai: dalinis efektyvumas, konkurencingumas, žemės ūkis, Vidurio ir Rytų Europos šalys, techninė pažanga