HUMAN CAPITAL IN THE AGRICULTURAL REGIONS

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ABSTRACT

Agricultural activity continues to play a significant role in the economy of the EU's rural areas. Therefore, in connection with the new budget cycle starting the 1st of January, 2014, the elaboration of the Common Agricultural Policy (CAP) has begun. The most important topics of the reforms of the CAP are food safety, supply safety, the agri-environment, the competitiveness of the agriculture and the development of the rural areas. One of the major means for the increase of competitiveness is the increase of the research-development support, and the development of human capital. Agri-education is able to make available new knowledge for everybody, which beyond the increase of productivity, will increase the growth prospect of agricultural firms and decrease unemployment. Thus, it contributes to the increase of competitiveness of the farmlands. According to the above mentioned, the goal of the research was to define how human capital can be measured and according to the results how we can classify the regions. Another task of the research was to circumscribe those regions of the countries of Visegrád (V4), where agricultural activity is outstanding, and to examine in these regions the development level of the human resurse.
Keywords: Competitiveness of the agriculture, development level of the human resource, Principal Component Analysis, Cluster Analysis

INTRODUCTION

The Common Agricultural Policy
In the reform of the Common Agricultural Policy, the support of competitiveness gets a particularly important role, as on the world's decisive parts agricultural productivity clearly has slowed down (*Jambor and Harvey,* 2010). From the several areas of the enchancement of the competitiveness, we have to pay the greatest attention to the increase of productivity. In the future, this has to be helped by the increase of the research development inputs and the innovation costs (*Bureau and Mahé*, 2008), so the owners will be able to produce higher added value products due to the use of more developed technologies. The rise of productivity is inconceivable without the improvement of human capital. Another key area of the reform is rural development, the second pillar of the CAP. In the future, the rural development policy has to put bigger emphasize on the struggle against rural poverty. We need programs dealing with the problems of rural poverty, such as the subservience of the rural economic enchancment and the development of the rural infrastructure (education, health care, etc.). So the improvement of human capital gets an

important role in both pillars of the CAP that contribute to the competitiveness of agriculture and the catching up of the rural areas.

The agriculture of the EU and the countries of Visegrád

The predominant areas of the European Union are covered by lands under agricultural cultivation process and forests that define the character of the landscape, and play significant role in the aspect of the activity of the rural farmlands. Agriculture contributes to the sustainable economical development of these areas. 90% of the EU's territory is rural area, the half on which is under cultivation process. This draws attention to the importance of sustainable economical development of the agricultural areas. Almost 60% of the population of the 27 member states live in rural areas, so rural development is an important policy area. In rural areas, agricultural and forestry activities are the main forms of utilizing the land, so they play a significant role in the life of the rural community. The effect of the enlargement of the EU (at first with 10 new members (Cyprus, the Czech Republic, Estonia, Poland, Latvia, Lithuania, Hungary, Malta, Slovakia and Slovenia) on the 1st of May, 2004, and later on with Bulgaria and Romania) on its agriculture is very significant. In the 15 former member states the agricultural population is 6 million strong and it increased by 7 million farmers. The 12 new member states enriched the former 130 million hectare territory by 55 million hectares of agricultural land, which means a 40% increase. Because of the above mentioned, the aims that serve the mitigation of the territorial inequalities are receiving more and more emphasis in the European Union's Common Agricultural Policy. The existence and status of internal resources significantly influence the position and opportunities of a given territory. We have to underline the role of knowledge and human capital, which in the last few decades led to the spread of the knowledge-based economy and knowledge-society definitions, which fundamentally influence the regions' development opportunities, the adoption to globalization and the formation of the territorial inequalities (*Rechnitzer and Smahó,* 2005). Despite the improvements of the new member states in the past few years in the field of the modernization and restructuring of the agricultural sector, one of the biggest challenges is the improvement of agricultural profitability and the general standard of living in rural communities. The differences in the living standards between the 15 former member states of the EU and the new ones are more emphatic in the rural areas. In these areas the lower incomes and the higher unemployment cause stress. The unemployment occurring in the agricultural sector strengthens the disadvantages of the rural areas. According to former researches, in the rural areas the significant and permanent agricultural origin unemployment contributes to the augment of territorial differences. One solution to this problem is human-capital based local economic development.

RESULTS AND DISCUSSION

The first task of our research was to determine characteristics which allow us to assess the state of development of a region's human resource. We collected indicators from the database of EuroStat 2002-2007, which are the most similar to

Rechnitzer's (2008) human resource dimensions. All of the used indexes are specific indicators and with the use of these indicators we can ensure that the different sizes of the regions do not influence the solutions. Five of the index numbers mark the human factors, we can demonstrate the dimension of the quality of life with 2 index numbers, and 2-2 index numbers express the quality of the innovation milieu, the living standards and knowledge (*Table 1*).

Table 1

Dimensions and indicators

Dimension of the human resource	Indicators
Human factors	Unemployment rate (15 years and over) %
	Employment rates (15 years and over) %
	Population aged 15 and over tertiary education - levels 5-6
	Students in tertiary education (ISCED 5-6) - as % of the population aged 20-24 years
	Pupils and Students in all levels of education (ISCED 0-6) – as % of total population
Quality of life	Internal regional migration, excluding intra-regional migration per 1000 inhabitant
	Net regional migration, excluding intra-regional migration per 1000 inhabitant
Standards of life	Life expectancy at given at birth
	Gross domestic product (GDP) Euro per inhabitant
Network of knowledge	Employment in technology and knowledge-intensive sectors
	Life-long learning - participation of adults aged 25-64 in education and training
Innovation milieu	Human Resources in Science and Technology percentage of total population
	Total R&D personnel and researchers percentage of total employment

The next step is to compress the information content of the thirteen indicators involved in the assey, into a smaller amount of uncorrelated variables. The smaller amount of variance assists in visualising data and helps clear understanding and analysis. According to the previously done Principal Component Analysis, we can determine three factors in the six years of the investigation. The joint explained variance exceeds 90% in every single year, so the three factors successfully retained the information content of the nine indicators chosen by the analysis. The nine examined indicators' communality exceeds 0.8. Communality is a multiplex determination coefficient, so the multiplex correlated coefficient calculated from that, shows the tightness of the relationship between the factors (interpreter variables) and the original variables (result variables). Based on these we can say

that the three principal components concentrate the nine indicators' information content. In all the six years of the analysis, three factors were formed, but not just the number of the factors was the same, but the index number content. The first 2 factors explain 40-40% of the variance of the initial variables. In the first factor, the most dominant is the 'Human Resources in Science and Technology percentage of total population' and the 'Employment rates (15 years and over)%'. There is a stronger than medium relationship between the value of the factor, the 'Gross domestic product (GDP) Euro per inhabitant' and the 'Life expectancy given at birth'. This factor determines *the Employment and living conditions* of the human resources. The second factor characterizes *the Qualification and scientific culture* of the examined regions' human resources. This is confirmed by the content of the index numbers which build up the factor. There is a tight positive correlation between the value of the factor and the 'Population aged 15 and over tertiary education - levels 5-6', the 'Students in tertiary education (ISCED 5-6) - as % of the population aged 20-24 years', the 'Total R&D personnel and researchers percentage of total employment' and the 'Employment in technology and knowledge-intensive sectors'. The third factor explains 15% of the original variance of the variables in those six years. The value of the factor increases if the ratio of the migrating population is on the increase, and the value decreases if the life expectancy at given at birth in the region increases. This factor shows *the negative quality of life* of the region's human resources, precisely express the prevailing depression (*Table 2*).

Table 2

Rotated Component Matrix, 2004

Indicators	Component		
	1	**2**	**3**
Population aged 15 and over tertiary education - levels 5-6	**0.972**	0.163	-0.008
Students in tertiary education (ISCED 5-6) - as % of the population aged 20-24 years	**0.964**	-0.103	-0.049
Total R&D personnel and researchers percentage of total employment	**0.802**	0.525	0.086
Human Resources in Science and Technology percentage of total population	**0.746**	0.639	-0.044
Employment rates (15 years and over) %	0.094	**0.972**	-0.100
Employment in technology and knowledge-intensive sectors	0.074	**0.959**	-0.006
Gross domestic product (GDP) Euro per inhabitant	**0.602**	**0.745**	0.192
Internal regional migration, excluding intra-regional migration per 1000 inhabitant	0.167	0.233	**0.915**
Life expectancy at given at birth	0.238	0.441	**-0.801**

One of the aims of the research is to group the examined regions by the level of the development of the human resource. With the help of hierarchic and non-hierarchic cluster analysis four distinctive groups could be created. This result is justified by discriminant analysis.

The first cluster is called a knowledge creator. The characteristics of the first cluster are the following: highly qualified; outstanding academic culture of the human resource; the employment rate and the living standards are high, but the quality of life is negative, the human resource is featured by depression. The members of this cluster the capital of Czech Republic, the regions that surround the capitals of Hungary and Slovakia. The negative quality of life can be described by the negative effects of the urbanization. From these cities the emigration has already begun agglomeration. This can be seen from the value of the „Internal regional migration, excluding per 1000 inhabitants" indicator which increases the value of the „Negative quality of life, depression" factor. Despite of the high emigration the net migration rate is positive. The GDP per capita in this cluster is two times more than in the second cluster, and three times more than the third and fourth clusters. This cluster can be called, according to Martin, a Knowledge Center Cluster, because the production of knowledge is very important. Moreover, social, economic and administrative processes of the countries are concentrated on these areas, which is strengthened by the increased use of the union's resources.

The second cluster is called an efficient knowledge adopter. The characteristics of the second cluster are the following: the standard of life is good; the rate of the emigration is low; the net migration is positive and the value of the "life expectancy at given at birth" is high. The high average of age shows that this cluster is an elderly cluster. This fact is proved by the low value of the "Students in tertiary education (ISCED 5-6) - as % of the population aged 20-24 years" and the "Population aged 15 and over tertiary education - levels 5-6" indicators. The employment rate in these regions is almost the same as in the first cluster. And the GDP per capita is one and half times more than in the third and fourth cluster. The unemployment rate is two times more than in the first cluster. The 8.11% of the economically active population is unemployed. There are seven regions from Czech Republic and one from the Slovakian Republic (Zapadne Slovensko) in this cluster. So in this cluster it is not knowledge creation that is important, but the adaptation of the received knowledge, which is the main source of competitiveness.

The third cluster is called a depressive knowledge adopter. The characteristics of the third cluster are the following: lowly qualified; low academic culture of the human resource; the value of the "Students in tertiary education (ISCED 5-6) - as % of the population aged 20-24 years" and the "Population aged 15 and over tertiary education - levels 5-6" indicators are higher than in the second cluster. Compared to the other clusters, in this cluster the values of the employment rate, standards of life and the quality of life are low. Six out of the seven Hungarian regions are situated in this cluster. In this cluster the value for depression is high and the value for "life expectancy at birth" and the mobility are low. The attractiveness of these regions is low and the negative balance of migration is the highest compared to the other regions.

The fourth cluster is called a balanced knowledge adopter. The characteristics of the fourth cluster are the following: highly qualified; developed academic culture of the human resource; the employment rate and the living standards are low, but the quality of life is the highest. All of the Polish regions and two Slovakian regions are situated in this cluster. Low depression can be featured in this cluster because of the high quality of life, high value of the "life expectancy given at birth" and the low value of emigration. The attractiveness of these regions is low. Despite the fact that emigration is low in these regions, the net migration balance is negative. In the examined six years, the cluster membership has not changed. It does not mean that the development of these regions has not changed, but the differences between the regions are stabilized.

After we had classified the 35 regions of the countries of Visegrád according to the characteristics of human capital, we examined their agricultural activity. We did the demarcation of the regions dealing with agricultural activity according to the ratio of NACE A-B sector's gross added value and the ratio of the employees in this sector. The ratio of the V4's agricultural gross added value exceeded the European Union's average value in all of the examined six years. The ratio of the Czech Republic's GDP in the first year of the examined period was outstanding, but in the following five years decreased dramatically. From 2004 Poland and Hungary are on the top of the list according to the ratio of their agricultural GDP. The ratio of Slovakia's agrarian gross added value is the lowest and gradually decreasing in the examined six years (*Figure 1*).

Figure 1

**GDP in sectors NACE A-B as % of total GDP**
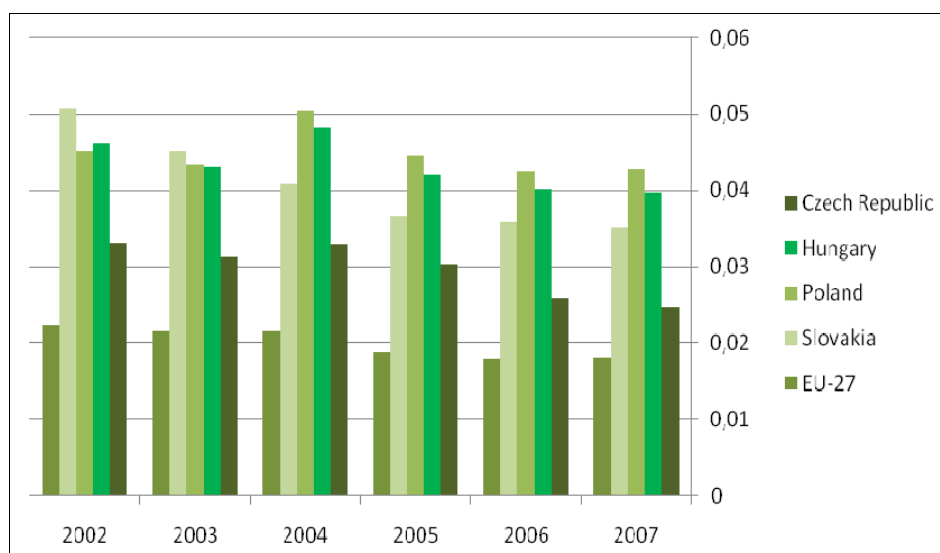
Source: Based on data from *Eurostat*, 2012

The ratio of the employees of the agricultural sector in Poland is twice the EU average, but in the 2002-2007 period we can observe a gradual and continuous reduction. In Hungary the ratio of the employees of the agricultural sector stays under average in 2002 and 2003. From the junction to the EU, this ratio grew above average, however, we can notice a slight decrease here as well. Slovakia's and the Czech Republic's ratio of the employees of the agricultural sector is behind the EU average and continuously decreases in the examined period (*Figure 2*).

Figure 2

**Employees in sectors NACE A-B as % of total employees**
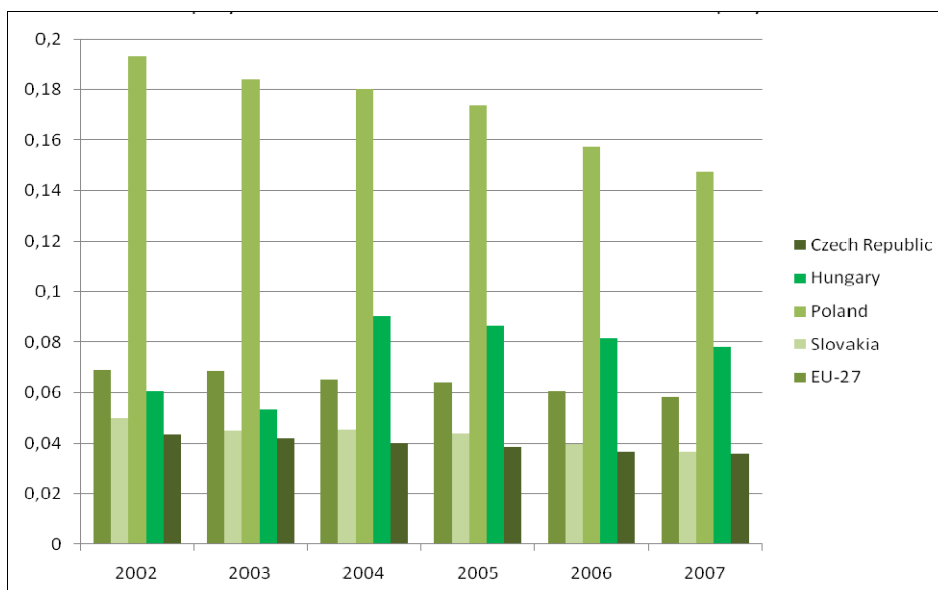
Source: Based on data from *Eurostat*, 2012

Based on the result of the cluster analysis according to the above indicators, the regions can be classified into four clusters. Memberships among the formed clusters didn't change during the six years of research. The agricultural region is considered to have a high ratio of employees in agriculture or a high ratio of gross added value, or both. According to this, the regions of the 2-4 cluster are agricultural regions in the relation of the countries of Visegrád. In the regions of the second cluster 15-25% of the employees work in agriculture and 3-7% of the country's GDP is produced by agriculture. In this cluster there are six regions of Poland. Agricultural work is best utilized in the regions of the third cluster, where 10-15% of the employees produce 8-12% of the national gross added value. In this cluster there are three regions of Hungary and two regions of Poland. In the fourth cluster more than 30% of the employees work in agriculture and more than 7% of the GDP is from this sector. In the mentioned cluster there are three regions of Poland (*Figure 3*).

Figure 3

Agricultural regions of the countries of Visegrád
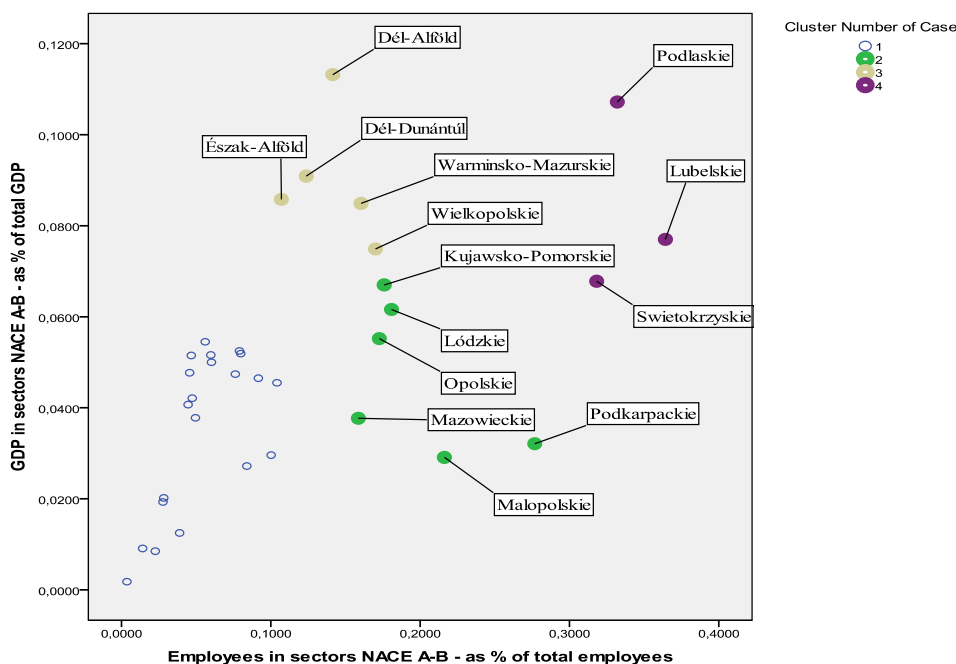
Source: Based on data from *Eurostat*, 2012

Resembling the agricultural clusters and the clusters according to the level of the development of human capital, we came to the conclusion that the agricultural region can only be found in the depressive knowledge adopter cluster and in the balanced knowledge adopter cluster. This result of our research confirms those things mentioned in the CAP's reform. Those rural areas dealing with agricultural production have lower-qualified human resources, lower quality of life, higher unemployment and migration. These characteristics contribute to more breakaways of the rural regions and to the augment of territorial differences. An important element of the EU's rural development policy is convergence, the catching up of the backward areas.

CONCLUSIONS

At the beginning of our study we reflected on the different criterion with which we can characterize the development of the human resources of a region, highlighting the fact that it is not enough to characterize the development of the human resources according to only some dimensions, as the complex factor of production can influence the ability to create value. Beyond the level and the ability to adapt knowledge, we have to take into consideration the income producing ability, the

health status, the quality of life and the living standards of the human resources. In our analysis using the specific thirteen indicators of the human resource, with the help of principal component analysis, we have chosen the most specific ones and arranged them into three factors. These three factors are characterized thus: "the qualification and scientific history", "the employment and living standards" and "the negative quality of life and depression" of the human resources. Along the three factors, the 35 regions of the Visegrád Countries can be arranged into 4 groups with the help of cluster analysis. Primarily these groups weren't formed according to the development level of the human resources, but the identities and differences occurring in the resources. Later on, with the help of cluster analysis we have chosen the so called agricultural regions. Agricultural regions are those where the ratio of employment in agriculture and/or the ratio of the added value produced by agriculture are above average. With the collation of the two groupings we can determine that the agricultural regions are between the depressive and the balanced knowledge adopter regions. The objective of the future Common Agricultural Policy for the increase of productivity and the improvement of the human capital may contribute to facilitating the catching up of these regions to the more developed areas of the European Union.

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