The Macrotheme Review
A multidisciplinary journal of global macro trends

THE COMPETITIVENESS OF REGIONS IN THE CENTRAL EUROPEAN TRANSITION COUNTRIES

IMRE LENGYEL* AND JÁNOS RECHNITZER **

*Institute of Economics and Economic Development, University of Szeged, Hungary**
*Department of Regional Studies and Public Policy, Széchenyi István University, Hungary***
*ilengyel@eco.u-szeged.hu**

Abstract

Nowadays the examination of regional competitiveness has become a research question of outstanding importance. Regional competitiveness strategies are especially important for the cohesion regions of the EU, since between 2014 and 2020 they will receive significant subsidies from the European Union's Structural Funds to improve the competitiveness of their lagging regions. In our study we will first look at the definition of competitiveness and the frames of interpretation related to its definition, then we will focus on the questions of its measurement. Afterwards we will proceed to analyse the competitiveness of 93 NUTS2 level regions of 8 Central European countries with the help of an empirical data base, using multivariable statistical methods.

Keywords: *Regional competitiveness, Pyramidal model, Classifying regions*

1. Introduction

Nowadays the investigation of the competition between territorial units, countries and regions has become one of the major questions of economics, generating vivid disputes. According to the well-known opinion of Krugman (1994) there is no competition between countries, since in the specialization of labour emerging according to comparative advantages, all countries will be winners with the standard of living improving everywhere. Therefore also in case of regions, the increasing rate of productivity and not competitiveness is going to be the determining factor. On the other hand, according to Porter (2008a) the competition between regions can be observed, but even here, similarly to the competition of industrial sectors, the competitive advantages, in other words, absolute advantages became important, since nowadays the comparative advantages hardly prevail.

It seems to be an accepted that the competition between regions exists, but its characteristics differ both from the competition between companies and the competition between countries (Camagni and Capello 2010; Chesire 2003; Malecki 2002). Capello (2007, xviii) states that "regions compete on absolute rather than comparative advantage". The consequences of regional competition are similar to the result of the competition between countries: the standard of living, employment and wages increase in the successfully competing regions, new investments appear,

talented and creative young people, businessmen move there, etc. (Camagni 2002; Malecki 2004). Due to the recognition of these factors success in competition and the examination of competitiveness have become major research questions in the recent decades. Regional competitiveness strategies are especially important for the new member states of the EU, since between 2014 and 2020 they will receive significant subsidies from the European Union's regional development funds to improve the competitiveness of their lagging regions.

In our study[1] we will first look at the definition of competitiveness and the frames of interpretation related to its definition, then we will focus on the models of competitiveness and the questions of its measurement. We will update the pyramidal model of regional competitiveness, which does not rest only on endogenous development theories, but also integrates the viewpoints of the region's key sectors, so called clusters. Afterwards we will proceed to analyse the competitiveness of 93 NUTS2 level regions of 8 Central European countries with the help of an empirical data base, using multivariable statistical methods.

2. The renewed pyramidal model of regional competitiveness

Nowadays the definition of competitiveness overlaps the theoretical and the practical, economic-political categories of both economic growth and economic development (Camagni and Capello 2010). Besides the many theoretical works, it is sufficient to mention the surveys dealing with the countries' competitive rankings appearing in yearly publications (IMD 2012; WEF 2012), and one of the key areas of the EU's regional policy (one of the aims of the 2014–2020 programming period is to improve regional competitiveness and employment), the *New Regional Competitiveness Index* first published in 2011 (Dijkstra, Annoni and Kozovska 2010).

In the course of the years many concepts of competitiveness were formed which spring from diverse opinions (Barkley 2008; Bristow 2010; Martin, Kitson and Tyler 2006; Porter 2008a). From an economic point of view, the competitiveness of territorial units, i.e. countries and regions can be measured by the *total factor productivity*, as Krugman (1994) said. Porter (2008b, 3) states: "Competitiveness depends on the productivity with which a location uses its human, capital, and natural resources. Productivity sets the sustainable standard of living".

The notion of regional competitiveness consists of two different, contradictory economic categories; expressing the joint expectation of productivity and *employment*. Built on this approach, the *standard notion of competiveness* is widely accepted as (EC 1999, 75): "*the ability of companies, industries, regions, nations and supra-national regions to generate, while being exposed to international competition, relatively high income and employment levels"*. In other words the competitiveness is "*high and rising standards of living and high rates of employment on a sustainable basis"* (EC 2001, 37). The *European Competitiveness Reports* also adopt this approach (EC 2008, 15): "*competitiveness is understood to mean a sustained rise in the standards of living of a nation or region and as low a level of involuntary unemployment, as possible*".

In our empirical study we also apply the standard concept of competitiveness, on which the *pyramidal model* we took as a basis is built (Lengyel 2004; Gardiner, Martin and Tyler 2004).

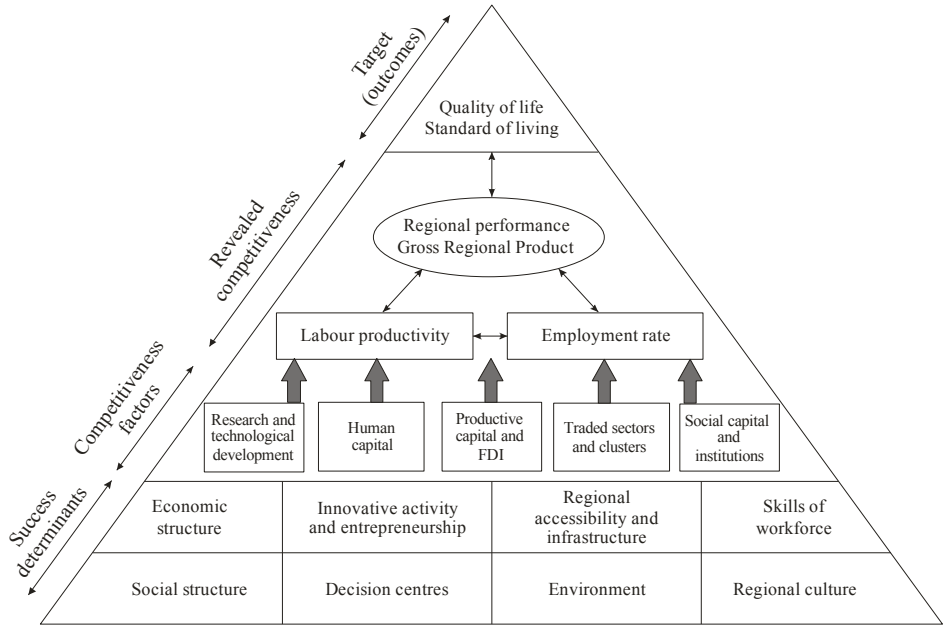
[1] This research was supported by project entitled TAMOP-4.2.1/B-09/1/KONV-2010-0003: Mobility and Environment: Car industry, Energetic and Environmental Researches in the Central- and West-Dunántúl Region.

This model systematizes the impact factors of exceedingly complex processes affecting welfare, labour productivity and employment. The pyramidal model has been adopted by many authors in international literature (Berumen 2008; Gardiner, Martin andTyler 2004; Lukovics 2009; Parkinson et al 2006; Resch 2008; Sinabell 2011; Snieska and Bruneckiené 2009), since "this model is useful to inform the development of the determinants of economic viability and self-containment for geographical economies" (Pike, Champion, Coombes, Humphrey and Tomaney 2006, 26). As it can be perceived in the pyramidal model, "more recent analytical review has sought to identify the interrelated factors that drive local and regional competitiveness" (Pike, Rodrígues-Pose and Tomaney 2006, 112).

The pyramidal model is established on the basis on the *inputs- outputs - outcomes* relationships (Lengyel 2004, 2009). Outcomes are the standard of living, the prosperity of any region depends on its competitiveness. Outputs are the *revealed competitiveness* indicators: per capita Gross Regional Product (GRP), labor productivity and employment rate. Sources of competitiveness, inputs influencing regional competitiveness can be divided into two groups of *direct* and *indirect* components. Of particular importance are *competitiveness factors* with a direct and *short-term influence* on economic output, labor productivity and employment rates. But social, economic, environmental and cultural processes and parameters, the so-called '*success determinants'*, with an indirect, *long-term impact* on competitiveness are also to be taken into account.

We have used the renewed pyramidal model on the basis of the above thoughts, starting from the endogenous development theory (Lengyel 2012; Lengyel and Szakálné Kanó 2012). The modifications of the pyramidal model can be traced back to endogenous growth and development theories, and consist of the redefinition of the competitiveness factors (Figure 1):

Figure 1 The renewed pyramidal model of regional competitiveness



Source: Lengyel (2012)

a) *Research and technological development:* determines the competitiveness of companies in a decisive way, because innovations and the introduction of new technologies and new products can become competitive advantages. The permanent growth of a region's competitiveness is primarily facilitated by the effective R&D activity in the region.

b) *Human capital:* an efficient educational and training system determining the standard, qualification of human capital, as well as the related entrepreneurship has become important in the formation of the differences in regional competitiveness.

c) *Productive capital and foreign direct investments*: The regions' economic development is strongly connected to their ability to draw and sustain a successful production activity. Incoming FDI increase employment (one of the basic categories of revealed competitiveness) on the one hand in a direct way, by generating new productive capacity, and on the other hand in an indirect way, by improving the competitiveness of local companies working as suppliers, subcontractors, outside workers, sub-agents.

d) *Traded sectors and clusters:* the income flowing into the region is generated in the traded sector, therefore these sectors are of major importance, as the economic base (export base) model also states. But local sectors also contribute as subcontractors, local business partners to the success of the companies participating in global competition, i.e. the formation of networks and clusters increases regional competitiveness, income, and improves employment.

d) *Social capital and institutions:* are of basic importance in regional economic development, since besides "tangible" elements (such as infrastructure for example), intangible assets also play a part in development. *Social capital* is especially important from the point of view of regional development, which is built on the characteristics of inter-company cooperation, cultural traditions and attitudes, aggregated experience, behavioural patterns, risk management, creativity etc.

The renewed pyramidal model builds both on endogenous growth and development theories. The factors taken as a basis in case of *endogenous growth theories* appear in the model, as well: capital (productive capital and FDI in the model), labour (human capital in the model), and technology (research and technological development in the model) (Capello and Nijkamp 2009; Stimson, Robson and Shyy 2009). The importance of the traded sector and clusters in regional specialization was pointed out by Porter (2003, 2008a). However, the social capital stated in endogenous development theories, and the clusters playing an important part in the updated economic base model also came to be included in the pyramidal model's competitiveness factors.

In the course of the empirical study of the regions of Central European countries the renewed pyramidal model is taken as a starting point. Not only revealed competitiveness indicators shall be analysed with the help of multivariable statistical procedures, but also the clustering for regions described by the competitiveness factors.

3. The empirical study of the competitiveness of Central European regions

The competitiveness of the NUTS2 level regions of eight countries has been analysed, altogether 93 regions. The distribution of these regions between the countries is disproportioned, since Germany's 39 regions represent an outstanding proportion, whereas the number of Slovenia's regions (2) is very small: Austria 9 regions, Czech Republic 8 regions, Germany 39 regions, Hungary 7 regions, Poland 16 regions, Romania 8 regions, Slovakia 4 regions, Slovenia 2 regions.

The objectives of our empirical study:

–the comparison of regions according to their revealed competitiveness;

–the classification of regions on the basis of their similarity.

We tried to compile the *database* of the empirical analysis according to the renewed pyramidal model. In many cases the supply of data is also incomplete, or in case of the appearance of new regions there are no older data. A part of soft type information (e.g. social capital) is not included in public and verifiable databases. As a result of the above we were not able to conduct a full-scale analysis of all the competitiveness factors with indicators following the rationale of the pyramidal model. In the course of the gathering of data we primarily relied on the Eurostat database and the publicly released indicators of cohesion reports no. 4 (CR4) and 5 (CR5). For the computerized investigations the SPSS-18 program pack was used.

Our database utilized for the empirical study consists of (Table 1):

–4 indicators expressing *basic categories of revealed competitiveness*;

–21 indicators describing *competitiveness factors*.

Table 1 Indicators of empirical investigation

Code	Denomination	Source
	Revealed competitiveness	
eugdp08	Regional gross domestic product (PPS per inhabitant in % of the EU-27 average), 2008, %	Eurostat
empr1509	Employment rate of the age group 15-64, 2007, %	Eurostat
dispinc07	Disposable income of private households (Purchasing power standard based on final consumption per inhabitant), 2007	Eurostat
labprod07	Labour productivity in industry and services (GVA per employee, in the average of EU27), 2007, %	CR5
	Research and Technological Development	
gerd07	Total intramural R&D expenditure (GERD), percentage of GDP, 2007, %	Eurostat
emphigh08	Employment in high-technology sectors within the number of total employed, 2008, %	CR5
fp707	7th Framework Program, average funding per head (EU27= 100), %	CR5
pat1607	Patent applications to the European Patent Office (EPO), average 2006-2007, per inhabitant	CR5
lisbind08	Lisbon Index (0–100), 2008	CR5
	Human Capital	
adedu08	Population aged 25-64 with tertiary education (ISCED 5-6), 2008, %	CR5
tertedu34	Population aged 30-34 with a tertiary education (ISCED 5-6), 2008, %	CR5
age25-64	The proportion of people aged 25–64 in the total population, 2004, %	CR4
weeklyh10	The number of average weekly hours worked (in full-time job 2010, hour	Eurostat
mwork78	That proportion of people from the active age population who moved into the region from outside in the past two years (from within the EU, 2007–2008, %	CR5
	Productive Capital and FDI	
gfcf07	Gross fixed capital formation per inhabitant (all NACE activities), 2007, Euro	Eurostat
	Traded Sectors and Clusters	
indust05	Employment in industry (% of total employment), 2005, %	CR4
serv05	Employment in services (% of total employment), 2005, %	CR4
	Social Capital and Institutes	
adedutr08	Participation of adults aged 25-64 in education and training, 2008, %	CR5
eudev07	EU Human Development Index (0–100), 2007, %	CR5
povrisk08	The proportion of the population subjected to poverty even after receiving social benefits, 2008, %	CR5
unempr09	Unemployment rate, 2009, %	Eurostat
lowedu08	Population aged 25-64 with low education, (ISCED 1-2), 2008 %	CR5
lunempr09	Share of long-term unemployment (12 months and more), percentage of total unemployment, 2009, %	Eurostat
unempy08	Youth unemployment rate, 2008, %	CR5
unhump07	UN Human Poverty Index (between 0–100), 2007	CR5

In the course of the examination of empirical data more methods were used:

–*principal component analysis*: to form a common scale from the 4 basic revealed competitiveness categories;

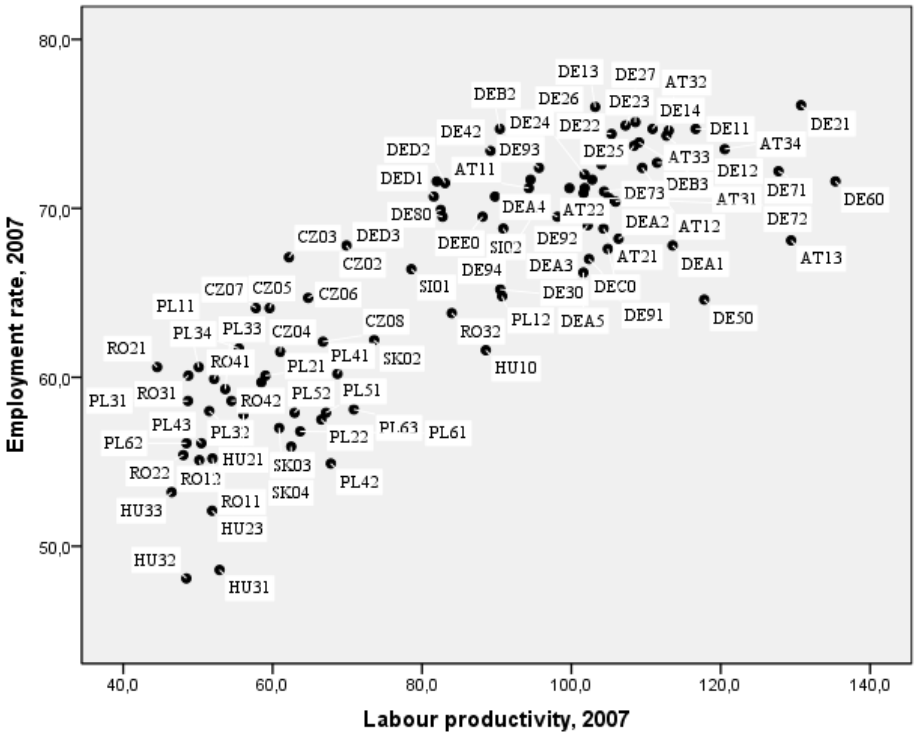
–*classification of regions*: with hierarchical clustering and multidimensional scaling by indicators of competitiveness factors.

4. Revealed competitiveness

Revealed competitiveness is measured by basic categories. On the basis of labour productivity and employment rate the situation of the 93 regions shows interesting, although well-known and anticipated correspondences (Figure 2). The linear correlation of the two data rows is +0,842, which means that they move closely together. The regression curve fitting to the points is:

$y=19,443 \ln(x) - 19,477$, where $R^2=0,7376$.

Figure 2 Connection between employment rate and labour productivity



Source: Own compilation, abbrev. see *Appendix 1*.

On the basis of labour productivity and employment rate the regions can be well divided into groups above-right and below-left the CZ02 – SI01 – RO32 – HU10 line. The group above-right the line includes all German and Austrian regions, as well as the Czech, Romanian, Hungarian, Polish and Slovakian capital regions, and the two Slovenian regions. While the group below-left the line consists of all the other regions of the post-socialist countries. Similar spatial

correspondences were pointed out on the basis of these indicators like in the course of typifying, certain regional types distinctly detach from each other, especially depending on the characteristics of the countries.

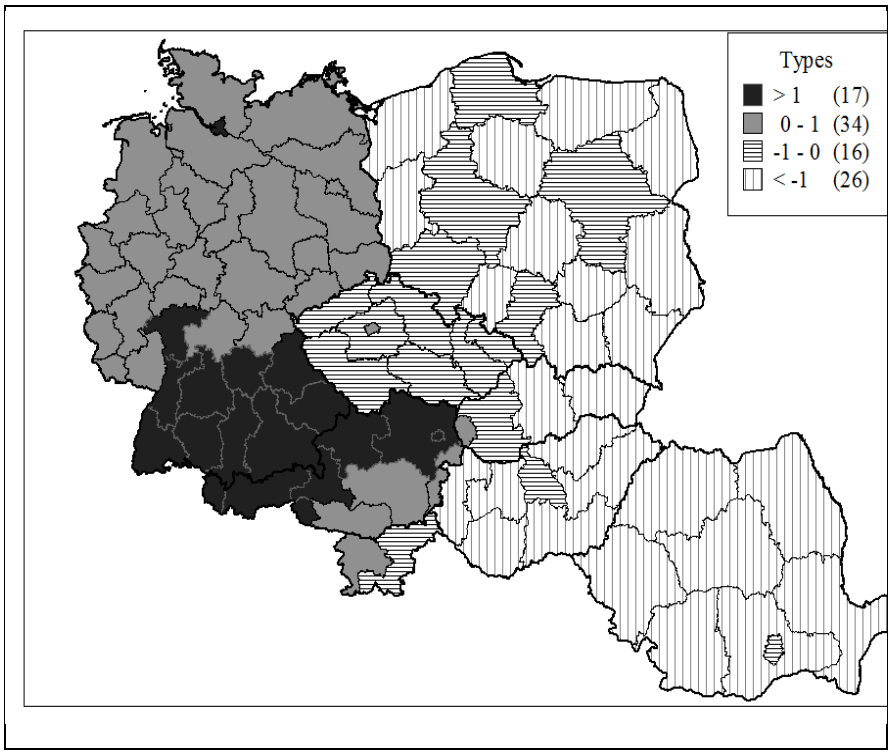
A common revealed competitiveness indicator is formed from the three basic categories, and to contract the information contained by the basic categories *principal component* analysis is applied (Lengyel and Szakálné Kanó 2012). From the four basic categories, GDP per capita will be ignored, because it depends on labour productivity and employment rate (Lengyel 2004). With the help of the three indicators, labour productivity (labprod07), the employment rate of people aged 25–64 (empr1509) and the available income of households (dispinc07), a principal component (RC) is established with the use of principal component analysis, which shall later be considered as a *dependent variable*:

–RC contains 92,8% of the information of the three indicators;

–Communalities: labprod07: 0,938; empr1509: 0,883 and dispinc07: 0,961.

This principal component shall hereinafter be referred to as *competitiveness principal component*, an indicator of revealed competitiveness (RC). The indicator values are dispersed around the interval of zero, therefore the regions of negative values may be regarded as regions of *weak competitiveness*, while those of positive values are considered as regions of *strong competitiveness*.

Figure 3 Types of regions by competitiveness principal component



Source: Own compilation.

The values of regions according to the competitiveness principal component, as types specified by factor values, show sharp spatial characteristics (Figure 3). A coherent area, the 'Alps-area' can be observed, which consists of South-German and North-Austrian regions of the strongest competitiveness. The other German and Austrian (and one of the Slovenian) regions, which may be regarded as the "middle mountains" connected to the Alps, constitute the second group (including Prague and Bratislava), which can still be regarded as being of strong competitiveness. The "hill-country" situated east from the Alps comprise the third group, consisting of mainly Czech regions, which means just one or two smaller hills the further we get from the Alps. The fourth group is the plain, with regions of very weak competitiveness.

The competitiveness principal component shows that the competitiveness of the regions depends strongly on their geographical proximity and distance from the "core" South-German and North-Austrian regions. The majority of the post-socialist countries' regions (except Slovenia and the Czech Republic), comprising a coherent area, can be found in the fourth type of regions with the weakest competitiveness, only the capitals and some industrial regions could make it into the third type.

5. Classifying regions of Central European countries

The types generated on the basis of the similarities of the 93 regions, the typifying of the regions was examined by clustering and multidimensional scaling. In both cases 21 indicators were used (see Table 1), i.e. 21 competitiveness factors were considered, performing standardization per indicator.

In case of cluster analysis a hierarchical procedure was chosen, which contracts similar regions on the basis of one tree structure until only one group remains. In the course of this procedure we can choose in a slightly arbitrary way the groups at which step shall be considered as the subject of our study, in this case the 6 types were accepted after step 10 (Table 2). There was one outlier: Voralberg (AT 34) which constituted an independent type until the very last step.

Table 2 Types of hierarchical clustering for regions

1	2	3	4	5	6
SK03	RO11	CZ01	DE60	DE42	SI01
SK04	RO42	SK01	AT13	DEG0	SI02
HU31	RO12	HU10	DE50	DED1	AT11
HU32	RO21	PL12	DE12	DE80	AT12
HU33	RO41	RO32	DE21	DEE0	AT21
HU23	RO22		DE91	DE41	AT22
PL11	RO31			DED2	AT31
PL21				DED3	AT33
PL63				DE30	AT32
PL42					DE93
PL51					DEF0
PL43					DE92
PL61					DEA1
PL62					DEA5
PL41					DEC0
PL31					DE73
PL52					DEB1
PL22					DE94
PL33					DEA3
PL32					DE22
PL34					DE27
CZ03					DE24
CZ05					DEA4
CZ06					DE71
CZ07					DEA2
CZ02					DE11
HU21					DE14
HU22					DE13
CZ08					DE23
SK02					DE72
CZ04					DEB3
					DE26
					DE25
					DEB2

Notes: Abbr. see Appendix 1.

The six clusters form characteristic types (Table 2):

Cluster 1: all Hungarian, Polish, Czech and Slovakian regions, except the capital regions,

Cluster 2: the Romanian regions, except the capital region,

Cluster 3: the Czech, Slovakian, Hungarian, Polish and Romanian capital regions,

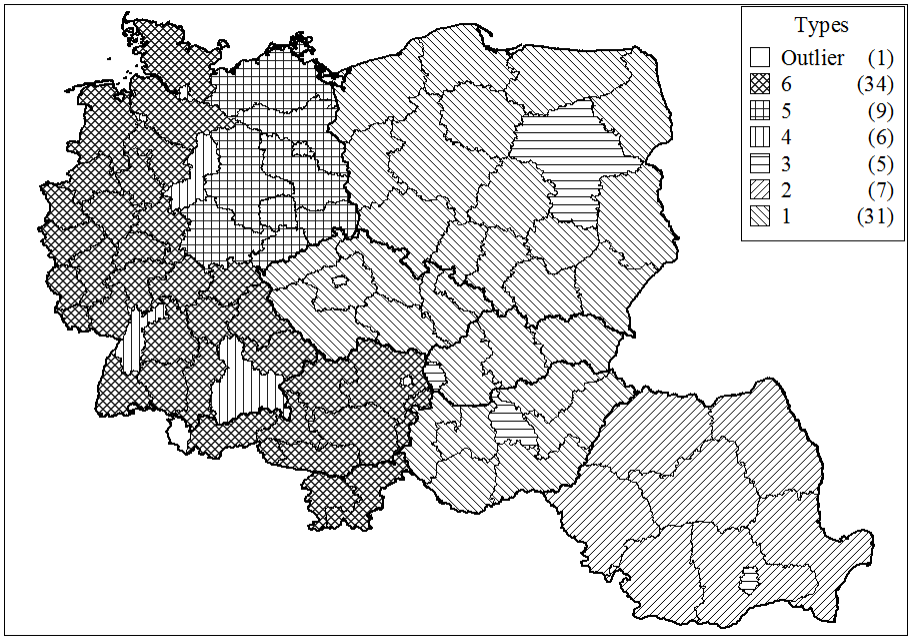
Cluster 4: German metropolitan (Hamburg, Bremen etc.) regions and the region of Vienna,

Cluster 5: East-German (post-socialist) regions,

Cluster 6: the two Slovenian, and the rest of the Austrian and German regions.

On the basis of the *spatial separation of region types* established by clustering, the use of the 21 indicators compiled for the study of regional competitiveness, it can be stated that the types are *determined by national characteristics* (Table 2; Figure 4). The regions of the post-socialist countries (except Slovenia and Romania) are present only in two clusters, in clusters 1 and 3, with the capital regions belonging to the latter. The regions of Romania, except the capital, have unique characteristics, creating a separate group (Cluster 2). The German, Austrian and Slovenian regions also constitute graphically separate groups, the 'East-German post-socialist' regions belong to the independent Cluster 5, while the rest are very similar to each other, except a few metropolitan regions (Cluster 4).

Figure 4 Types of clustering for regions



Source: Own compilation.

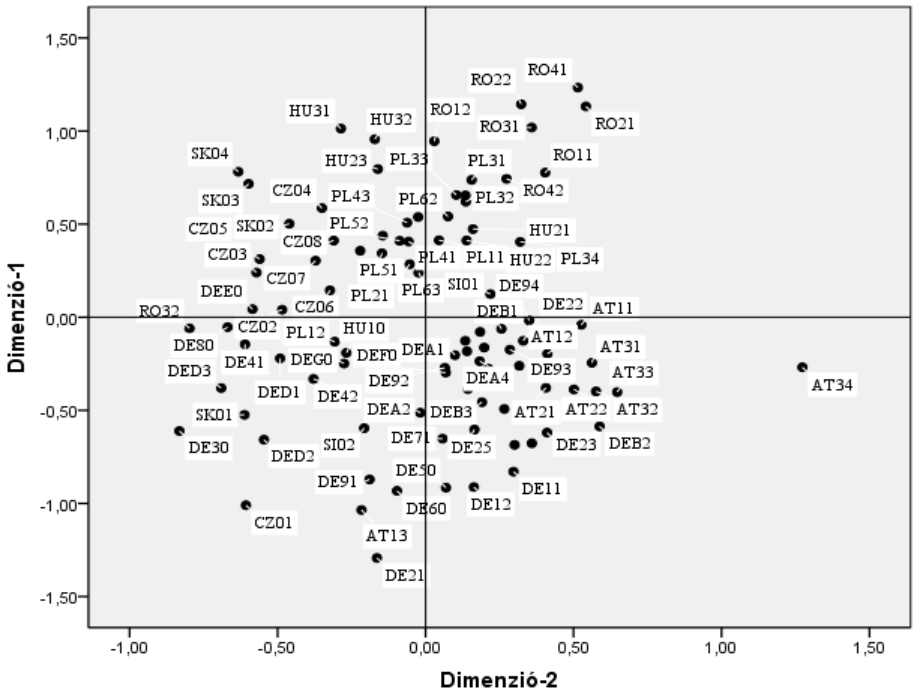
Clustering highlights similarity, so on the basis of the 21 indicators similar historical courses seem to show up, picturing the long-term dominance of the socio-cultural-historical roots between countries. A *powerful spatial separation* can be observed; the regions making up the individual clusters constitute "bands" from west to east. The regions of the post-socialist countries, including the East-German provinces, detach themselves from the rest, with the only exceptions of Slovenia and Romania. The effect of the *urbanization agglomeration advantages* can also be observed (Capello 2007), on the one hand, the capital regions of the post-socialist

countries constitute a separate group, and on the other hand the German (Hamburg, Bremen etc.) and Austrian (Vienna) metropolises also detach themselves (Clusters 3 and 4) from the rest.

The similarities between regions were also examined by *multidimensional scaling*, using a PROXSCAL procedure. In a two dimensional point figure mainly similar shapes can be observed for hierarchical clustering, whereas the different types' relationship to each other, their location, proximities and similarities are also pictured (Figure 5).

In the figure the regions of the ex-socialist countries detach themselves from the German and Austrian regions (Voralberg, AT34 is an outlier here as well), only the Slovenian regions integrate into the latter, and the capital regions got close to them (Prague, CZ01 "positioning" from outside). The multidimensional scaling made on the basis of 21 indicators pictures different courses of development, and similarly to clustering, it pinpoints the socio-economic-historical background and past impact still subsisting today (Lengyel, B. and Leydesdorff 2011). It is very important to note that the regions do not mix, the regions within the same country showing similar characteristics are located in each other's proximity, only the capitals are detached. That is to say that the characteristics, institutional background, etc. of a given country still determine regional characteristics. The differences between countries are stronger than the differences within the countries.

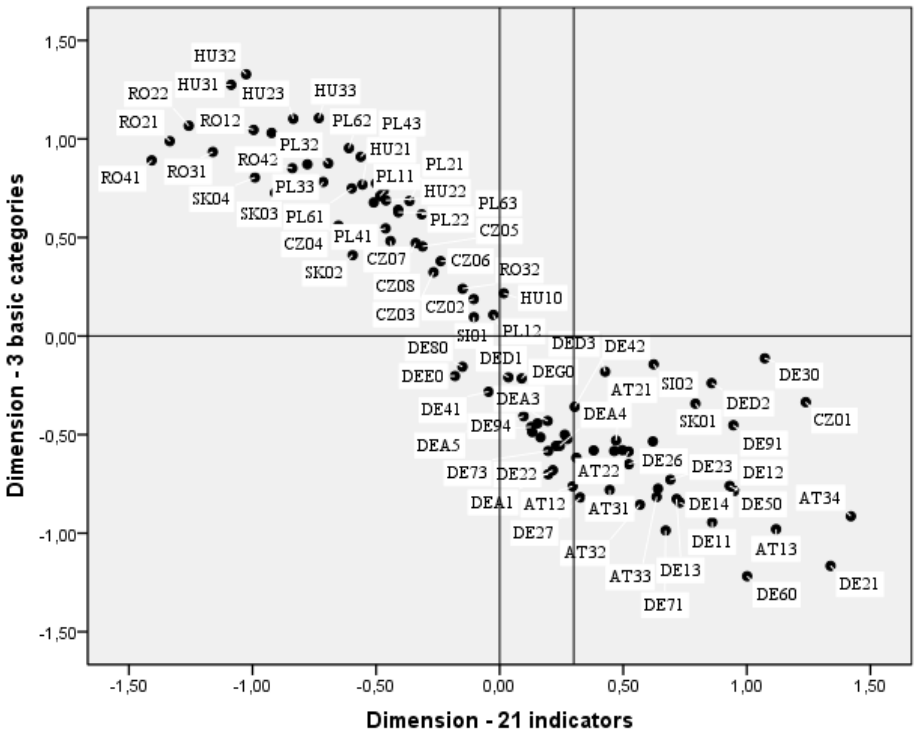
Figure 5 Position of regions by multidimensional scaling



Source: Own compilation.

In the pyramidal model the competitiveness factors are the causes and the revealed competitiveness categories are the effects, however, they are in obvious interaction with each other. Calculating separately and illustrating together the *one dimensional scaling* of the 21 competitiveness factors and the 3 revealed competitiveness categories it is possible to see whether the specific characteristics of the regions are prevalent, i.e. whether there are dominant background processes, or the results of the two different scaling are randomly diffused (Figure 6).

Figure 6 Positions of regions by one-dimensional scaling



Source: Own compilation.

There seems to be a *strong connection* between the two scales calculated from the two different indicator groups: the one dimensional projection of the regions according to revealed competitiveness categories resulted in a figure similar to that of the scaling calculated from the 21 competitiveness factors. The linear correlation of the two data rows is -0,906, which means that they move closely together. The polynomial regression curve fitting on the points is:

$y= 0,1754\, x^2 - 0,9529\, x - 0,0771,$ where $R^2=0,8359.$

6. Conclusions

In our study the redefinition of the pyramidal model was introduced to interpret, measure the concept of regional competitiveness and demonstrate its influencing factors, in which besides human and social capital, traded sectors are also included. Multivariable statistical procedures were applied to demonstrate the correspondences, examine the database compiled from the data of the 93 regions of the 8 Central European countries. Due to the difficulty of obtaining international data, the database generally contains data from the years 2008 and 2007, i.e. shows the situation before the global crisis.

From the results we point out that the competitiveness of the German, Austrian and Slovenian regions is in every respect considerably stronger than that of the other countries' regions, only the capital regions may be numbered among them. Regions of strong competitiveness cluster spatially, and the regions of the following type are located in their neighbourhood, in their geographical proximity.

On the basis of the results of standardizations and scaling utilizing competiveness indicators it is probable that regions form groups in the long run on the basis of their specified social-historical characteristics. These types are not random: the regions of a country generally cluster in one place, are similar to each other, and only partly mix with the regions of other countries. Only the capitals of the post-socialist countries and the Slovenian regions can get close to the German and Austrian regions. The effect of the urbanization agglomeration advantages can also be observed, the capital regions of the post-socialist countries constitute a separate group.

References

Barkley, D. L. (2008) Evaluations of Regional Competitiveness: Making a case for case studies. – *The Review of Regional Studies,* 2: 212-143.
Berumen, S. A. (eds) (2008) *Cambio tecnológico e innovación en las empresas*. ESIC Editorial, Madrid.
Bristow, G. (2010) *Critical reflections on regional competitiveness*. Routledge, London-New York.
Camagni, R. (2002) On the Concept of Territorial Competitiveness: Sound or Misleading? – *Urban Studies,* 13: 2395-2411.
Camagni, R. and Capello, R. (2010) Macroeconomic and territorial policies for regional competitiveness: An EU perspectives. – *Regional Science Policy & Practise,* 1: 1-19.
Capello, R. (2007) *Regional economics*. Routledge, London and New York.
Capello, R. and Nijkamp, P. (eds) (2009) *Handbook of regional growth and development theories*. Edward Elgar, Cheltenham.
Chesire, P.C. (2003) Territorial Competition: Lessons for (Innovation) Policy. In Bröcker, J., Dohse, D. and Soltwedel, R. (eds) *Innovation Clusters and Interregional Competition.* Springer, Berlin: 331-346.
Dijkstra, L., Annoni, P. and Kozovska, K. (2011) *A New Regional Competitiveness Index: Theory, Methods and Findings*. Working Papers no. 02/2011, European Commission, Directorate-General for Regional Policy, Brussels.
EC (1999) *Sixth Periodic Report on the Social and Economic Situation and Development of Regions in the European Union*. European Commission, Luxembourg.
EC (2001) *Second Report on Economic and Social Cohesion*. European Commission, Brussels
EC (2008) *European Competitiveness Report 2008*. European Commission, Brussels.
Gardiner, B., Martin, R. and Tyler, P. (2004) Competitiveness, Productivity and Economic Growth across the European Regions. – *Regional Studies,* 9: 1045-1068.
IMD (2012) *The World Competitiveness Yearbook*. IMD, Lausanne.

Krugman, P. (1994) Competitiveness: A dangerous obsession. – *Foreign Affairs*, 2: 28-44.
Lengyel, B. and Leydesdorff, L. (2011) Regional innovation systems in Hungary: The failing synergy at the national level. – *Regional Studies*, 5: 677-693.
Lengyel, I. (2004) The Pyramid Model: Enhancing Regional Competitiveness in Hungary. – *Acta Oeconomica,* 3: 323-342.
Lengyel, I. (2009) Knowledge-based local economic development for enhancing competitiveness in lagging areas of Europe: The case of the University of Szeged. – Varga, A. (eds) *Universities, Knowledge Transfer and Regional Development: Geography, Entrepreneurship and Policy*. Edward Elgar, Cheltenham–Northampton: 322-349.
Lengyel, I. (2012) Competitiveness of regions of Visegrad Group (Czech Republic, Hungary, Poland and Slovakia). Paper prepared for the conference on „*Regions in Motion - Breaking the Path*" 52nd European Congress of the Regional Science Association International, 4th Central European Regional Science Conference (21th August – 25th August 2012, Bratislava, Slovakia) p. 41.
Lengyel, I. and Szakálné Kanó, I. (2012) Competitiveness of Hungarian Urban Microregions: Localization Agglomeration Economies and Regional Competitiveness Function. – *Regional Statistics*, vol. 52., special issue 2: 27-44.
Lukovics, M. (2009) Measuring Regional Disparities on Competitiveness Basis. – Bajmócy, Z. – Lengyel, I. (eds): *Regional Competitiveness, Innovation and Environment*. JATEPress, Szeged: 39-53.
Malecki, E. J. (2002) Hard and Soft Networks for Urban Competitiveness. – *Urban Studies,* 5-6: 929-945.
Malecki, E. J. (2004) Joykeing for position: What it Means and Why It Matters to Regional Development Policy When Places Compete. – *Regional Studies,* 9: 1101-1120.
Martin, R., Kitson, M. and Tyler, P. (eds) (2006) *Regional Competitiveness*. Routledge, Abingdon.
Parkinson, M. et al. (2006) *State of the English Cities. A Research Study*. Volume 1. Office of the Deputy Prime Minister, London.
Pike, A., Champion, A., Coombes, MG., Humphrey, L. and Tomaney, J. (2006*) The economic viability and self-containment of geographical economies: a framework for analysis*. Office of the Deputy of Prime Minister, London.
Pike, A., Rodrígues-Pose, A. and Tomaney, J. (2006) *Local and regional development*. Routledge, New York.
Porter, M. E. (2003) The Economic Performance of Regions. – *Regional Studies,* 6-7: 549-578.
Porter, M. E. (2008a) *On competition*. *Updated and expanded edition*. Harvard Business Press, Boston.
Porter, M. E (2008b) *Regional Competitiveness in a Global Economy*. The Summit for American Prosperity, The Brookings Institution, Washington.
Resch, J. (eds) (2008) *Handbuch Lernende Regionen Grundlagen*. Österreichisches Institut für Erwachsenenbildung (ÖIEB), Wien.
Sinabell, F. (eds) (2011) *Indikatoren für die Auswirkungen des Programms der Ländlichen Entwicklung 2007/2013 in Österreich*. Österreichisches Institut für Wirtschaftsforschung, Statistik Austria, Universität für Bodenkultur Wien, Wien.
Snieska, V. and Bruneckiené, J. (2009) Measurement of Lithuanian Regions by Regional Competitiveness Index. – *Engineering Economics,* 1: 45-57.
Stimson, R., Robson, A. and Shyy, T-K. (2009) Modeling regional endogenous growth: an application to the non-metropolitan regions of Australia. – *The Annals of Regional Science:* 379-398.
WEF (2012) *The Global Competitiveness Report 2011-2012*. World Economic Forum, Genf.

Appendix 1 Codes and names of the NUTS2 regions

CZ01	Praha	DE94	Weser-Ems	AT34	Vorarlberg
CZ02	Střední Čechy	DEA1	Düsseldorf	PL11	Łódzkie
CZ03	Jihozápad	DEA2	Köln	PL12	Mazowieckie
CZ04	Severozápad	DEA3	Münster	PL21	Małopolskie
CZ05	Severovýchod	DEA4	Detmold	PL22	Śląskie
CZ06	Jihovýchod	DEA5	Arnsberg	PL31	Lubelskie
CZ07	Střední Morava	DEB1	Koblenz	PL32	Podkarpackie
CZ08	Moravskoslezsko	DEB2	Trier	PL33	Świętokrzyskie
DE11	Stuttgart	DEB3	Rheinhessen-Pfalz	PL34	Podlaskie
DE12	Karlsruhe	DEC0	Saarland	PL41	Wielkopolskie
DE13	Freiburg	DED1	Chemnitz	PL42	Zachodniopomorskie
DE14	Tübingen	DED2	Dresden	PL43	Lubuskie
DE21	Oberbayern	DED3	Leipzig	PL51	Dolnośląskie
DE22	Niederbayern	DEE0	Sachsen-Anhalt	PL52	Opolskie
DE23	Oberpfalz	DEF0	Schleswig-Holstein	PL61	Kujawsko-Pomorskie
DE24	Oberfranken	DEG0	Thüringen	PL62	Warmińsko-Mazurskie
DE25	Mittelfranken	HU10	Közép-Magyarország	PL63	Pomorskie
DE26	Unterfranken	HU21	Közép-Dunántúl	RO11	Nord-Vest
DE27	Schwaben	HU22	Nyugat-Dunántúl	RO12	Centru
DE30	Berlin	HU23	Dél-Dunántúl	RO21	Nord-Est
DE41	Brandenburg - Nordost	HU31	Észak-Magyarország	RO22	Sud-Est
DE42	Brandenburg - Südwest	HU32	Észak-Alföld	RO31	Sud - Muntenia
DE50	Bremen	HU33	Dél-Alföld	RO32	Bucureşti - Ilfov
DE60	Hamburg	AT11	Burgenland (A)	RO41	Sud-Vest Oltenia
DE71	Darmstadt	AT12	Niederösterreich	RO42	Vest
DE72	Gießen	AT13	Wien	SI01	Vzhodna Slovenija
DE73	Kassel	AT21	Kärnten	SI02	Zahodna Slovenija
DE80	Mecklenburg-Vorpommern	AT22	Steiermark	SK01	Bratislavský kraj
DE91	Braunschweig	AT31	Oberösterreich	SK02	Západné Slovensko
DE92	Hannover	AT32	Salzburg	SK03	Stredné Slovensko
DE93	Lüneburg	AT33	Tirol	SK04	Východné Slovensko