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The role of clusters in the development of Hungarian city-regions

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Paper prepared for the conference on
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The role of clusters in the development of Hungarian city-regions

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Abstract

More and more scholars of regional science are interested nowadays in the question what role do clusters in microregions play in the knowledge-based economy. This question can be dealt with from the functional or nodal regions point of view and one has to examine the factors that influence regional competitiveness. The answers are especially important for the Hungarian microregions, since between 2007 and 2013 they are aimed with significant subsidies from EU regional development funds to improve their competitiveness.

In this paper we outline our analytical framework: the UFO-model of regional/local economic development. After this the paper assesses the competitiveness types of the Hungarian functional microregions, as city-regions (LAU1). A complex methodology, with the help of multi-variable data analysing methods, is used throughout our statistical analysis to underlie the classification of microregions. For the clusters mapping in these microregions we apply the location quotient (LQ) method.

Keywords: regional competitiveness, cluster-based regional economic development, cluster mapping, LQ-method

1. Introduction

Increasing regionalization represents one of the most spectacular processes of the economies that develop and transform as a result of globalisation processes: while the (relative) importance

of national economies is decreasing, the economic role of regions and cities seems to grow. Global competition has intensified also in space, especially with the growing importance of the knowledge-based economy. Interregional competition, which refers to the competition of regions and cities for scarce resources, global aims and so on, is increasingly prevalent. The modes of improving regional competitiveness and the regional economic development strategies are heavily dependent on the type of the given regions.

Regional economic development strategies are especially important for the new member states of the EU, since between 2007 and 2013 they will receive significant subsidies from the European Union's regional development funds to improve the competitiveness of their lagging regions. The analysis of this issue calls for clarifying various questions for the less developed regions. What do we mean by regional competitiveness and how can it be described and measured? Do the economic, social and institutional background and the cultural characteristics of a region influence regional economic development strategies? Which development strategy can most significantly improve regional competitiveness in the lagging regions?

After reviewing the most important features of regional competitiveness, this study provides a detailed analysis of the so-called "UFO model" serving as a cluster-based improvement of regional competitiveness. On the basis of this model we outline the regional economic development ideas aiming to improve the competitiveness of regions with different development levels. This model is suitable for the systematization of both top down regional policy and bottom-up regional economic development ideas, consequently it was also applied for the planning of the economic development strategies of the different micregions types of the Southern Great Plain region in Hungary.

After examining the UFO-model, we are going to investigate into the competitiveness of Hungarian regions and microregions, putting special emphasis on various types of competitiveness in microregions and their geographic locations. Microregions with a population of above 70 thousand citizens are especially important in regards of competitiveness, thus the results of a cluster mapping performed by using the LQ-methodology is presented as well.

2. UFO model: cluster-based regional economic development

Successfulness in competition, or in other words, *competitiveness* has been one of the key concepts often used and quasi 'fashionable' in many areas of economics over the past two or three decades partly due to the acumination of global competition. It is a fashionable term the use

of which seems nowadays to be nearly obligatory. In Iain Begg's apt formulation: "improved competitiveness, as we all know, is the path to economic nirvana" (Begg 1999, p. 795).

The objective of regional and local economic development is the improvement of the standard of living and quality of life of the region's inhabitants. Hence economic development and competitiveness are strongly connected, only those kinds of programmes belong into the competence of economic development which improves regional competitiveness.

Two major issues emerged in the debates aiming at the interpretation of competitiveness: on one hand, *how to define regional competitiveness and what indicators should be used to measure it?* On the other hand, *how can regional competitiveness be improved*, which governmental and local interventions may be regarded as successful? These two questions usually lie in the background of other professional debates too; while representatives of academic economics concentrate on the first one, experts of regional policy tend to focus on the second one.

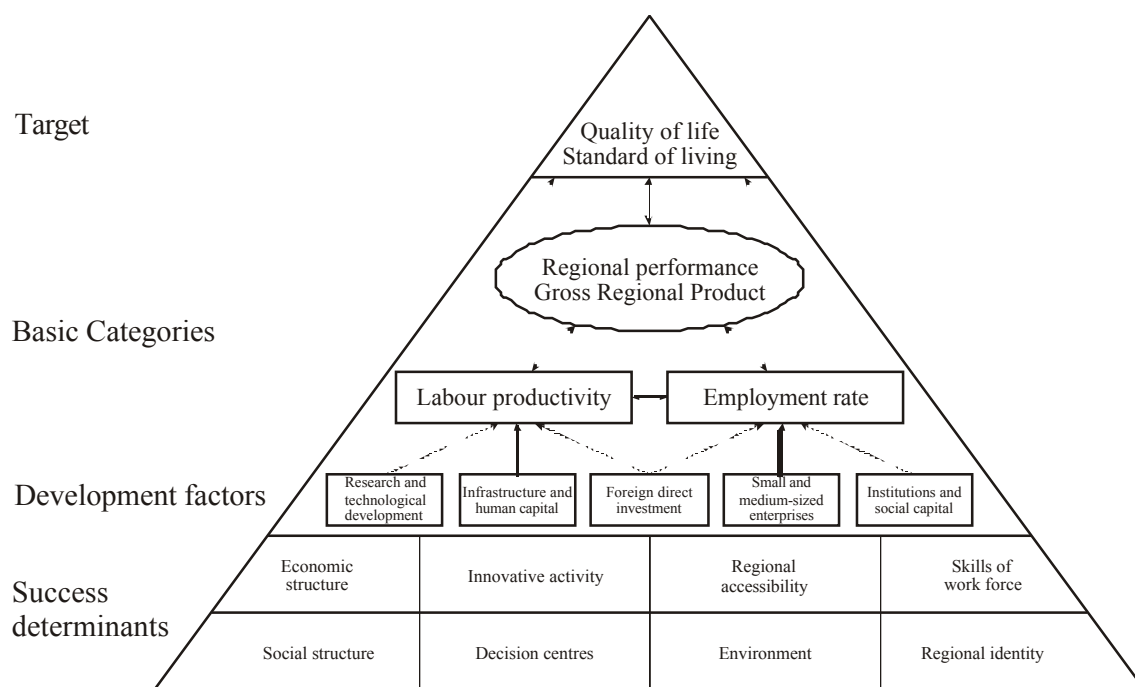
There were a number of attempts to define the new notion of competitiveness according to new global competition conditions in the mid 1990s. The *standard notion of competitiveness* in the Sixth Regional Periodic Report of EU (EC 1999): '*The ability of companies, industries, regions, nations and supra-national regions to generate, while being exposed to international competition, relatively high income and employment levels*'. In other words 'high and rising standards of living and high rates of employment on a sustainable basis' (EC 2001). In the European Competitiveness Report (EC 2008, p. 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 the report of Regional Competitiveness Indicators of UK (DTI 2002): 'Regional competitiveness describes the ability of regions to generate income and maintain employment levels in the face of domestic and international competition'.

Hence the *substance of regional competitiveness*: the economic growth in the region, which growth is generated by both a *high level of labour productivity* and a *high level of employment*. In other words, competitiveness means *economic growth driven by high productivity and a high employment rate*.

The notion of competitiveness obtained in this way cannot be used, however, to identify factors responsible for regional competitiveness or areas which are to be strengthened or developed by regional development policies and programmes for improved competitiveness. Since the notion of competitiveness can be seen as refining that of economic growth, it can often

be observed that proposals for improved competitiveness combine traditional means of economic development with methods based on endogenous development.

Figure 1. The pyramidal model of regional competitiveness



Source: Lengyel (2000, 2004)

The *pyramidal model of regional competitiveness* seeks to provide a systematic account of these means and to describe the basic aspects of improved competitiveness (Figure 1). ‘This model is useful to inform the development of the determinants of economic viability and self-containment for geographical economies’ (Pike et al, 2006a, p. 26). ‘This is an aggregate notion, ..., in a regional context, labour productivity is the outcome of a variety of determinants (including the sort of regional assets alluded to above). Many of these regional factors and assets also determine a region’s overall employment rate. Together, labour productivity and employment rate are measures of what might be called ‘revealed competitiveness’, and both are central components of a region’s economic performance and its prosperity (as measured, say, by GDP per capita), though obviously of themselves they say little about the underlying regional attributes (sources of competitiveness) on which they depend’ (Gardiner – Martin – Tyler 2004, p. 1049).

The standard of living, prosperity of any region depends on its competitiveness (Begg 2002). Factors influencing regional competitiveness can be divided into two groups of *direct* and *indirect* components. Of particular importance are programming factors with a direct and short-

term influence on economic output, profitability, labour productivity and employment rates (Huggins 2003, Lengyel 2004). 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 (Enyedi 1996, Jensen-Butler 1999).

Three levels can be distinguished with regard to the objectives of regional development programming and the various characteristics and factors influencing competitiveness:

- *Basic categories* of regional competitiveness (*ex post* indicators; revealed competitiveness): these categories measure competitiveness and include income, labour productivity, employment and openness.
- *Development (programming) factors* of regional competitiveness (*ex ante* factors; improving competitiveness): factors with an immediate impact on basic categories. These can be used to improve regional competitiveness by means of institutions in short-term programming periods.
- *Success determinants* of regional competitiveness (social and environmental conditions; sources of competitiveness): determinants with an indirect impact on basic categories and development (programming) factors. These determinants take shape over a longer period of time and their significance reaches beyond economic policy-making

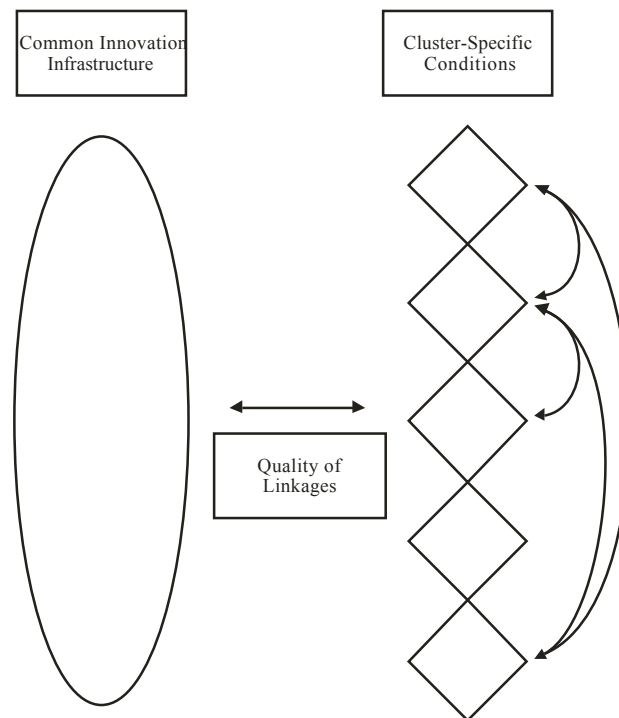
The elements of regional competitiveness are systematized by the pyramidal model, which reduces the components of economic development to connected factors (Enyedi 2009, Pike et al 2006b). Can competitiveness be improved by developing the same factors in all kinds of regions? What determines the success a regional development strategy?

The vitality of regional development strategy in a region is depend on regional innovative capacity. ‘This capacity is not simply the realized level of innovation but also reflects the fundamental conditions, investments, and policy choices that create the environment for innovation in a particular location’ (Porter - Stern 2001, p. 5). The regional innovative capacity depends on three broad elements: common innovation infrastructure, cluster-specific conditions, and quality of linkages (*Figure 2*). Porter has argued that traded regional clusters are capable of improving competitiveness and therefore proposed a *cluster-based approach to regional economic development* (Porter 2003a).

In line with the structure of the pyramidal model and element of regional innovative capacity, we distinguish between three levels of bottom-up regional economic development programmes aiming to improve regional competitiveness (*Figure 3*): success factors, common

innovation background, cluster specific conditions, and linkages. While on the basis of the pyramidal model the competitiveness can be measured and the influencing factors can be systematized, cluster-based development enhances the basic industries of the regions, and by doing so it reinforces specialization necessary for meeting the challenge of global competition.

Figure 2. Elements of regional innovation capacity



Source: Porter – Stern 2001, p. 5.

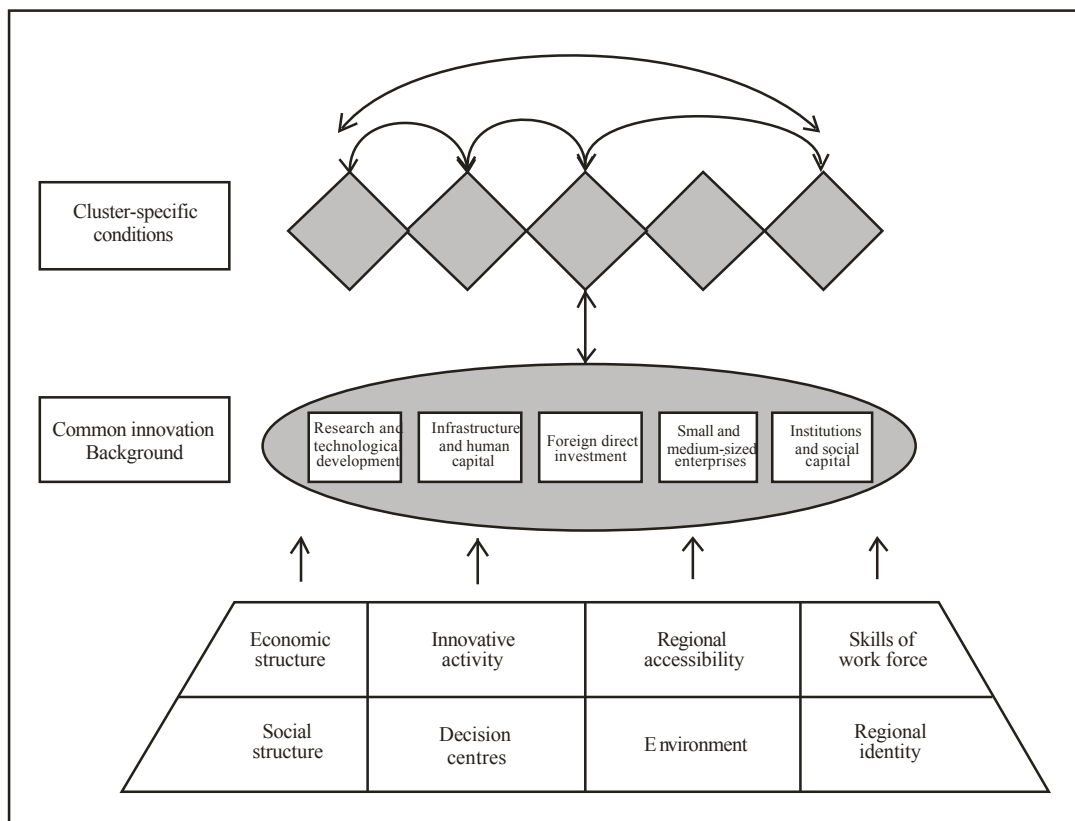
On the basis of *UFO model* (Unconventional Framework of Operational programming) we outline the regional economic development ideas aiming to improve the competitiveness of regions with different development types (Lengyel 2009b, 2010). The UFO model is suitable for the systematization of both regional planning and cluster-based regional economic development ideas, consequently it can be also applied for the planning of the economic development strategies of the different subregion (nodal region) types.

Three levels of UFO model can be distinguished with regard to the objectives of regional development strategies and the various characteristics and factors influencing regional competitiveness (*Figure 3*):

- *Success determinants*: on the basis of the pyramidal models, the reinforcement of certain absent or weak background conditions of region's economy, which are the bottlenecks of

regional development. Regarding these actions interregional competition does not emerge, fundamental public utilities and amenities must be guaranteed in the least developed regions as well. Thus within the meaning of cohesion all the regions must be supported that are in need.

Figure 3. UFO-model: the structure of bottom-up regional economic development



Source: own construction

- *Common innovation background:* such programmes aiming at the improvement of regional competitiveness, systematized on the basis of the economic development factors of the UFO model, that further the reinforcement of most of the industries' and enterprises' competitive advantages in the regions. The regional development strategy of the common innovation background depends on the development/competitive type of the region (see next chapter). In connection with the improvement of the common innovation background interregional competition can be observed among the similar regions. This is why the regional organization of bottom-up economic development is important, in order to support solely those regional programmes and projects that are able to improve regional competitiveness the most.

- *Cluster specific conditions*: in more regions it is possible that innovative clusters will emerge. In other regions the emergence of manufacturing and tourism clusters can be expected. Clusters generate very intense interregional competition. To develop similar industries are endeavoured also in other regions of the country, therefore only those regional economic development strategies will be able to succeed that are based on regional consensus and unity and that aim to improve the competitive advantages on the given industry's enterprises.
- *Linkages*: it is essential that there should be interdependence between programmes aiming to improve the common innovation background and clusters, because only this approach can result in the development of regional competitiveness.

The UFO model can successfully be applied as a demonstration scheme in purpose of systematizing development programmes of regions for improving regional competitiveness. Because of the interregional competition, however, in the nodal regions cluster-based programmes must also be developed and constantly managed with the involvement of the concerned enterprises.

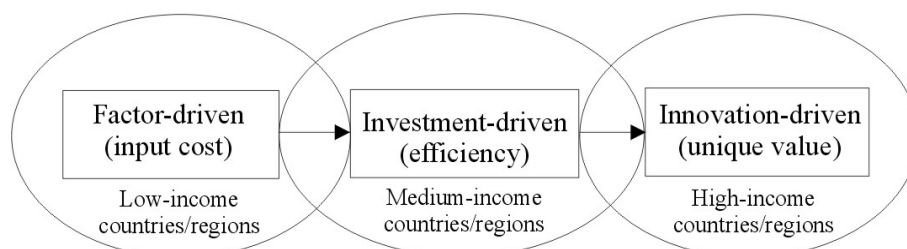
3. Competitive regional development

Different 'market places' also occur in the global competition of countries, regions and cities. Tödtling and Trippl (2005, p. 1209) describe three types of regions by problem areas and regional innovation deficiencies: peripheral region (organisational thinness), old industrial regions (lock-in), and fragmented metropolitan regions. In 2003 one of the research projects of the EU analysed the factors influencing regional competitiveness and how dominant the elements determining competitiveness are in different region types in order to create the foundation of regional policy between 2007 and 2013. During the research four 'theoretical' region-types were distinguished based on two dimensions, density of population and the growth rate of GDP (Martin et al, 2003, pp. 6-23): non-productive regions, regions as production sites, regions as sources of increasing returns, and regions as hubs of knowledge.

Based on the characteristics of *competitive advantages*, Porter (1990, 2003b) distinguishes three stages in the countries' development built upon one another. On the basis of the amount of specific GDP and the competition strategies of global industry branches these are (*Figure 4*): factor-driven, investment-driven and innovation-driven phases. The three phases of competitive

development designed for countries can also be applied in the case of regions (Lengyel 2003a). And these types are very useful to underlie the bottom-up regional development strategies of the regions.

Figure 4. Stages of competitive development of countries/regions



Source: own construction based on Porter (2003b, pp. 26-28)

The division of labour among the subnational regions of a country is different from that of different countries. A region cannot develop own economic policies; instead, its economy specializes as a consequence of market processes and central governmental development decisions. Nowadays, *knowledge-based economy* strongly shapes the specialization patterns of a country's regions with different development levels, and also changing the former characteristics of interregional competition (Grosz – Csizmadia – Rechnitzer 2005, Lengyel, B. – Leyesdorff 2010). Consequently, the three phases of competitive development should be specified based on the processes of the knowledge-based economy by using the specialisation of the *postfordist economy* (Cooke 2001, Lengyel 2010).

Based on the differences among regions it is preferable to differentiate where knowledge is created and where it is only adapted (Asheim 2001, Bajmócy 2006, Lengyel B. 2005). In the case of competitive regional development only in the innovation-driven phase can it be stated definitely that competitive advantages derive from knowledge creation, while in the investment- and factor-driven phases they originate from the mere adaptation of knowledge. Less developed, lagging regions are in an exposed situation, certain features of the knowledge-based economy are present, but *neofordist characteristics* are decisive (Lengyel 2003a).

In harmony with the phases of competitive development *three types of postfordist regions* must be distinguished (Asheim 2001, Lengyel 2010, Martin et al 2003):

- *Neofordist region*: factor-driven phase (regions with low income and input cost), regions as production sites,

- *Knowledge transfer region (knowledge adopted region)*: investment-driven phase (regions with medium income and efficiency), regions as sources of increasing returns, and
- *Knowledge creation region*: innovation-driven phase (regions with high income and unique value), regions as hubs of knowledge.

Neofordist and knowledge transfer regions differ from knowledge creation regions not only in terms of the sources of competitive advantages, but also because they are economically exposed and fragile, first of all in the transition economies (Enyedi 2009, Papanek – Borsi – Tompa 2008, Rechnitzer 2000). The decision centres of global companies hardly occur in less developed regions, so they demand knowledge less; rather the executive type activities of global companies are present here. Besides assembly plants, units of global companies selling products and performing service activities on the local market, local branches of international banks and insurance companies, and sometimes subsidiaries engaging in minor research activities also operate here. Naturally, most regions are 'mixed', but while neofordist and knowledge transfer activities and companies also exist in knowledge creation regions, the number of firms based on knowledge creation is close to zero in neofordist regions (Lengyel 2003b).

In the course of the debate on regional competitiveness, it is increasingly acknowledged, that regions with similar state of development compete with each other, while amongst the different types of regions there is rather rivalry (Camagni 2002, Malecki 2004, Polenske 2004, Hall 2001). Competition is especially intense among metropolises, but within the EU or a country there also exist interregional competition amongst nodal regions with similar state of development.

Concerning the three region types reviewed above, different development strategies must be applied, which means that *the improvement of competitiveness demands different measures based on the different types of regions*. These steps correspond to the phases of competitive regional development and at the same time indicate that competitiveness can be improved only with the help of complex programmes. The UFO model systematizes those economic development priorities that adjust to the real social-economic situation and the achievable (realistic) aims of the different region types. The improvement of regional competitiveness depends on the consistent realisation of these development strategies.

Concerning the three region types reviewed above, different economic development programmes must be applied, which means that *the improvement of competitiveness demands*

different strategies based on the different types of regions (Table 1). These steps correspond to the phases of competitive regional development and at the same time indicate that competitiveness can be improved only with the help of complex bottom-up programmes. The UFO systematises those economic development priorities that adjust to the real social-economic situation and the achievable aims of the different types. The improvement of regional competitiveness depends on the consistent realisation of these development programmes.

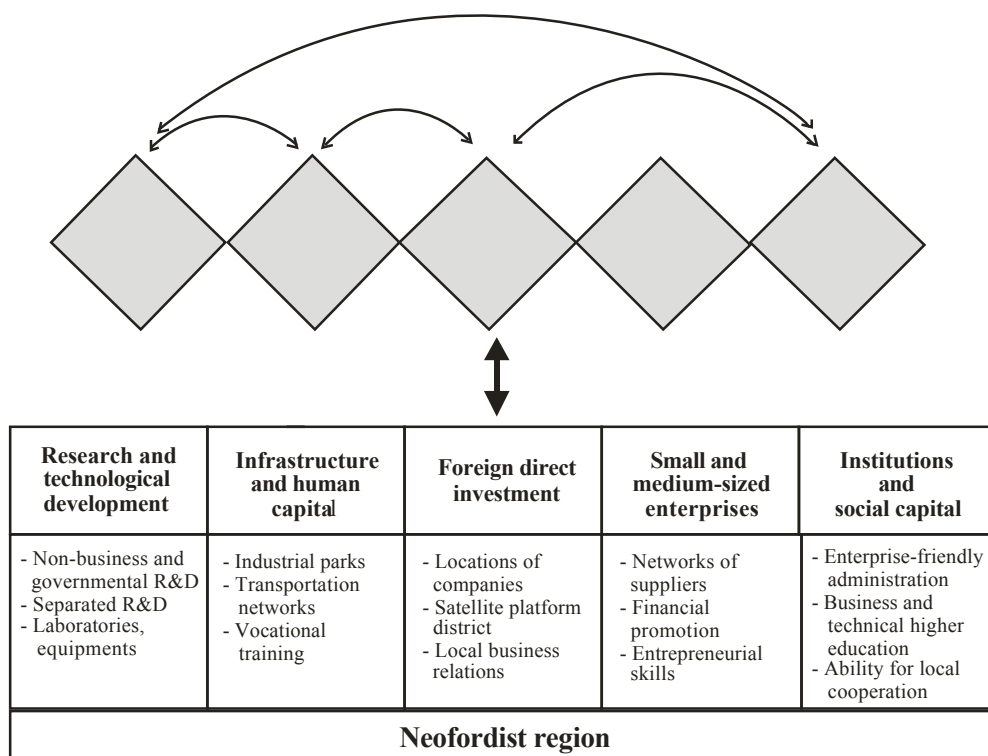
Table 1. Elements of common innovation background of the distinct types of regions

	Research and technological development	Infrastructure and human capital	Direct investment outside from region	Small and medium-sized enterprises	Institutions and social capital
Knowledge creation	Harmonised business and non-business R&D Integrated R&D Innovative milieu	Science parks Communication networks Problem-oriented trainings, retrainings	Attracting decision centres Hub-and-spoke district Local supporting and related industries	Clusters Venture capital Business incubators for spin-off	Collaboration among administration and businesses Cluster-oriented high education Regional identity
Knowledge transfer	Applied R&D Coordinated R&D Technology transfer	Innovation centres, incubators Business infrastructure Task-oriented vocational trainings	Supported investments Satellite-Marshallian industrial district Local value chain	Horizontal networks Business services for start-up Trainings for managers	Decentralized administration High education by local business Non-profit organizations
Neofordist	Non-business and governmental R&D Separated R&D Laboratories, equipments	Industrial parks Transportation networks Vocational training	Location of companies Satellite plat form district Local business relations	Networks of suppliers Financial promotion Entrepreneurial skills	Enterprise-friendly administration Business and technical higher education Ability for local cooperation

Source: Lengyel (2010)

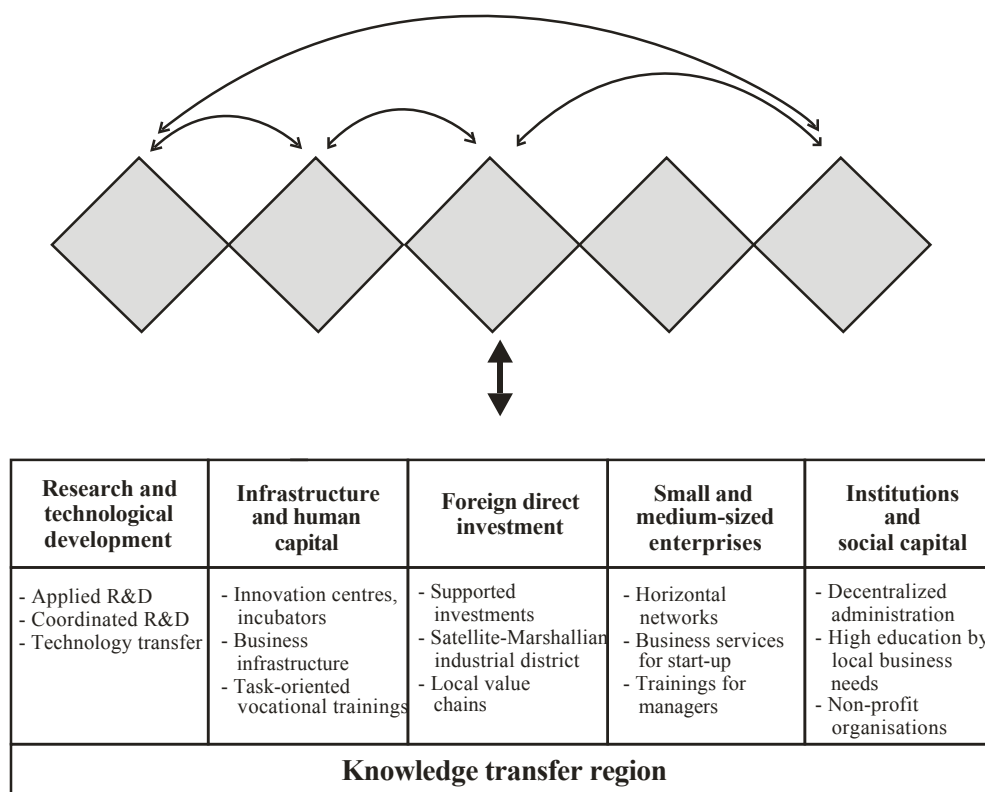
The *neofordist region* is underdeveloped, it corresponds to a semi-periphery, the generated income (GDP/habitant) is low, and the economy is typically in the factor-driven phase (*Figure 5*). The development of infrastructure is insufficient, the education level of the labour force is low, the members of company management are not competitive internationally and part of the qualified labour force and talented young people leave the region (Lengyel 2002). The major goal focuses on developing the technical infrastructure (transportation network, energetics, etc.) and attracting the sites of global companies with prepared industrial areas, low local taxes, low wages, etc.

Figure 5. Bottom-up economic development of neofordist region



Source: Lengyel 2009b, p. 29.

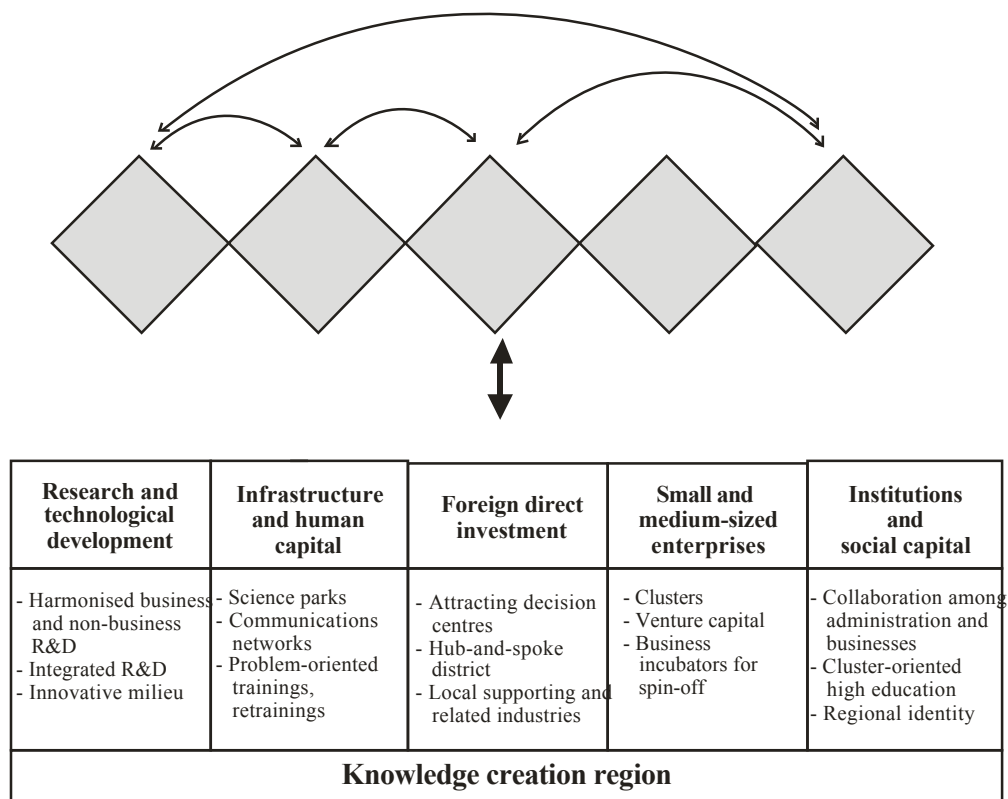
Figure 6. Bottom-up economic development of knowledge transfer region



Source: Lengyel 2009b, p. 31.

Knowledge transfer regions are usually medium developed, the most important goal of economic development lies in continuing the structural change by keeping existing companies and creating work places with higher added value (*Figure 6*). These regions are in the investment-driven phase, they have traded large companies with local headquarters, which already have a network of local SMEs as their contractors. Transportation infrastructure is developed; therefore, the *improvement of the local business environment* is in focus. The education level of the labour force and the training structure already correspond to the needs of the economic sphere, retraining programmes and courses to improve managerial skills are frequent (Lengyel 2010).

Figure 7. Bottom-up economic development of knowledge creation region



Source: Lengyel 2009b, p. 32.

In *knowledge creation regions* economic output is high, these regions are in the innovation-driven phase and the regional centres of significant global companies are situated here (*Figure 7*). Administration is decentralised, a cluster-based economic development is set as an objective partly due to this to improve the business environment necessary to strengthen the competitive advantages of global companies with local headquarters. Developing the background of

innovation capacities is in focus, scientific parks, universities, incubator programmes, venture capital and other schemes have an important role.

Every county (and region) is heterogeneous, since it consists of subnational regions with significantly different state of development. Due to the strong interregional competition, bottom-up strategies must be developed in all regions. These should refer to reinforcement of clusters beside the common innovation background. This is the only way that provides an opportunity for the improvement of regional competitiveness.

4. Types of microregional competitiveness in Hungary

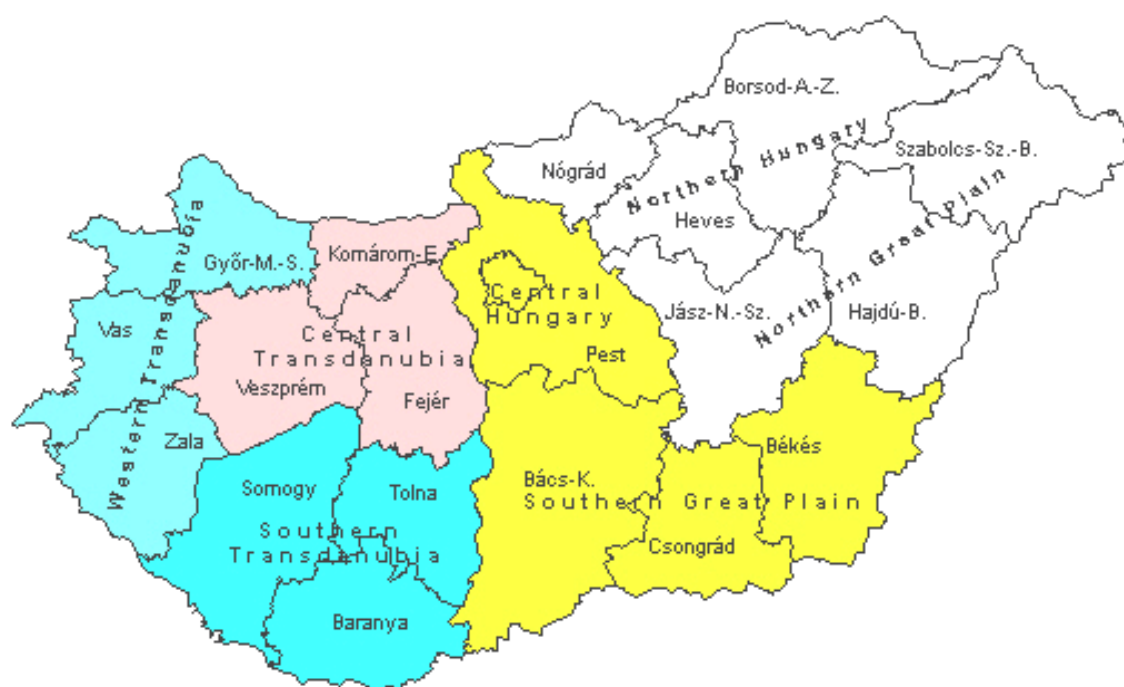
Cluster-based, bottom-up economic development strategies are highly dependent on the state of development and competitiveness of a given region. In order to apply cluster-based competitiveness improvement strategies in regions, one has to consider nodal regions, functional regions established from labor movement zones as city-regions. In the United States, micropolitan and metropolitan regions are considered city-regions.

Hungary consists of 7 regions (NUTS 2), 19 counties (NUTS 3) and the capital, as well as 174 microregions (LAU 1 microregion) (*Table 2, Figure 8*). Statistical data usable for competitiveness investigations are available for these geographic levels. Labour zones often extend beyond the borders of microregions, but latter are still well applicable for investigating into competitiveness as well as the establishment of cluster-based economic development strategies. All microregions have an urban center. First, the competitiveness of Hungarian regions shall be introduced; afterwards we are going to examine microregions.

Table 2 Territorial levels of Hungary

Level of territorial units	Number of territorial units
NUTS 1 = macroregion	3
NUTS 2 = region	7
NUTS 3 = county	19 + Budapest (capital)
LAU1 = subregion, microregion	173 + Budapest (capital)

Figure 8 Regions and counties in Hungary



Basic categories of competitiveness (GDP per capita, employment rate, labour productivity) show a very specific spacial pattern in Hungary. The capital and its agglomeration are evolving in a dynamic manner, North-Western parts of the country between Budapest and the Austrian border are stagnating, while all other regions are gradually falling behind in comparison to the EU average. Regional differences are immense and still growing after the accession to the European Union.

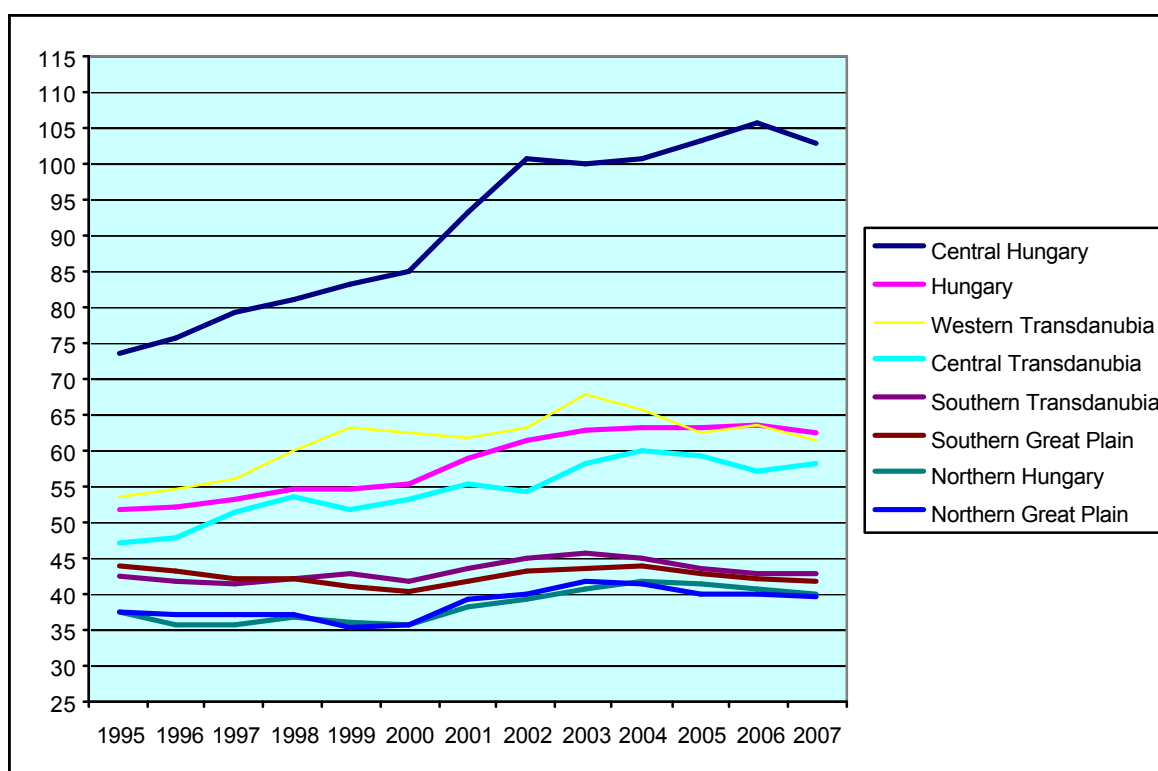
Table 3. Basic indicators of competitiveness of Hungarian NUTS 2 regions

Regions (NUTS 2)	GDP/capita % (PPS)		Labour productivity (GDP per employee) (PPS)		Employment rate (15 to 64 year old), %	
	2004	2007	2004	2007	2004	2008
European Union - 27	100.0	100.0	100.0	100.0	63.0	65.9
Hungary	63.4	62.6	68	71	56.8	56.7
Central Hungary	101.0	103.1	95	106	62.9	62.7
Central Transdanubia	60.9	58.3	61	61	60.3	60.3
Western Transdanubia	66.8	61.6	64	63	61.4	62.1
Southern Transdanubia	45.8	42.8	52	55	52.3	51.0
Northern Hungary	42.6	40.3	51	52	50.6	49.5
Northern Great Plains	42.1	39.5	51	51	50.4	49.9
Southern Great Plains	44.9	41.9	51	50	53.6	54.5

Source: The author's own calculation based on KSH Területi Statisztikai Évkönyv

In regards of *regional GDP per capita*, a close-up was happening between 1995 and 2003 in each Hungarian region, however, economic growth became limited after 2004 in six regions (Figure 9). The four least competitive regions are falling more and more behind the EU average to about 40-43% of the same, and this cooling down was observable from about 2003. Before quickly growing Western and Central Transdanubian regions have lost momentum as well since 2004.

Figure 9 Per capita outputs of regions (GDP/capita) expressed in percent of the EU-27 (PPS)



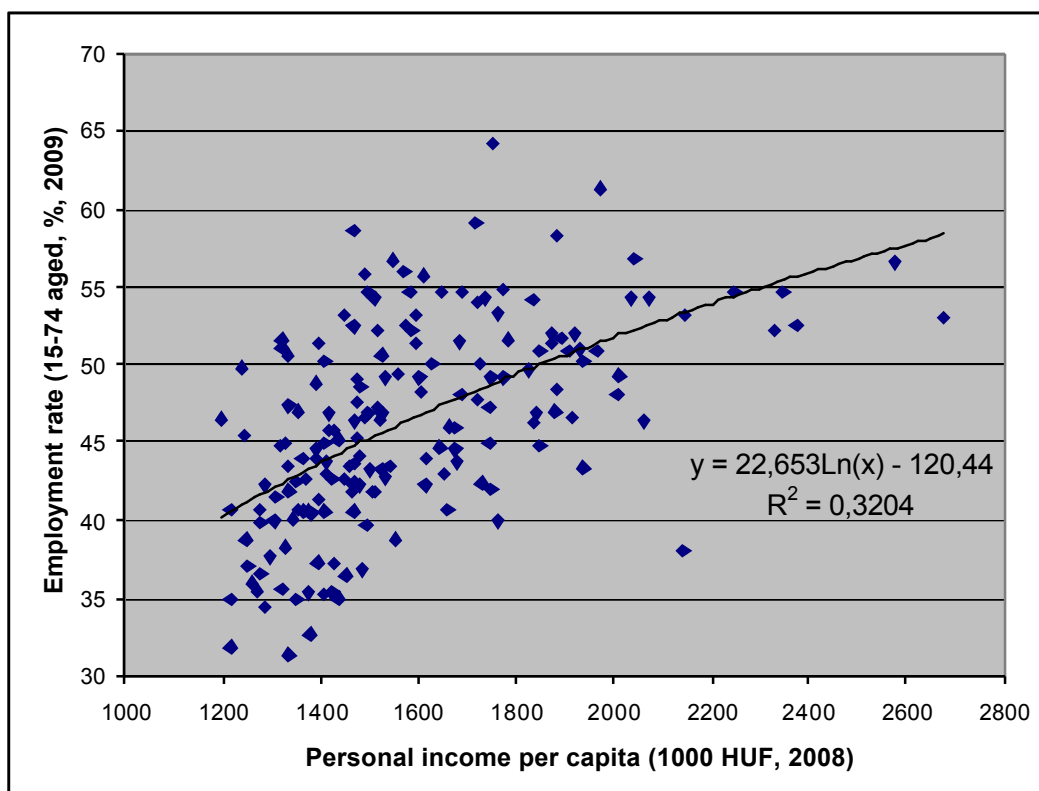
Source: Hungarian national accounts 1995-2007 KSH (November 2009)

The pyramidal model is well usable for evaluating the competitiveness of Hungarian microregions. This analysis rests on multivariable statistical data and a detailed indicator system, enabling a classification of microregions by competitiveness types. Clusters in urban microregions are evaluated along these competitiveness types.

Basic categories of the pyramidal model (income, employment, labor productivity) show a broad distribution in microregions. Economic output (GDP) cannot be measured in statistical microregions; therefore the *personal income tax base* is used. Comparing two basic categories, namely *employment rate* and *personal income tax base per taxpayer*, we can see a strong relationship up to 1.800 thousand HUF, meaning that a higher employment rate results in higher

salaries due to demand and supply in the labor market (*Figure 10*). Above this value an intense distribution can be observed, typically ranging from 45 to 55 %. High income microregions can be found in and around the capital, as well as in some microregions containing major cities.

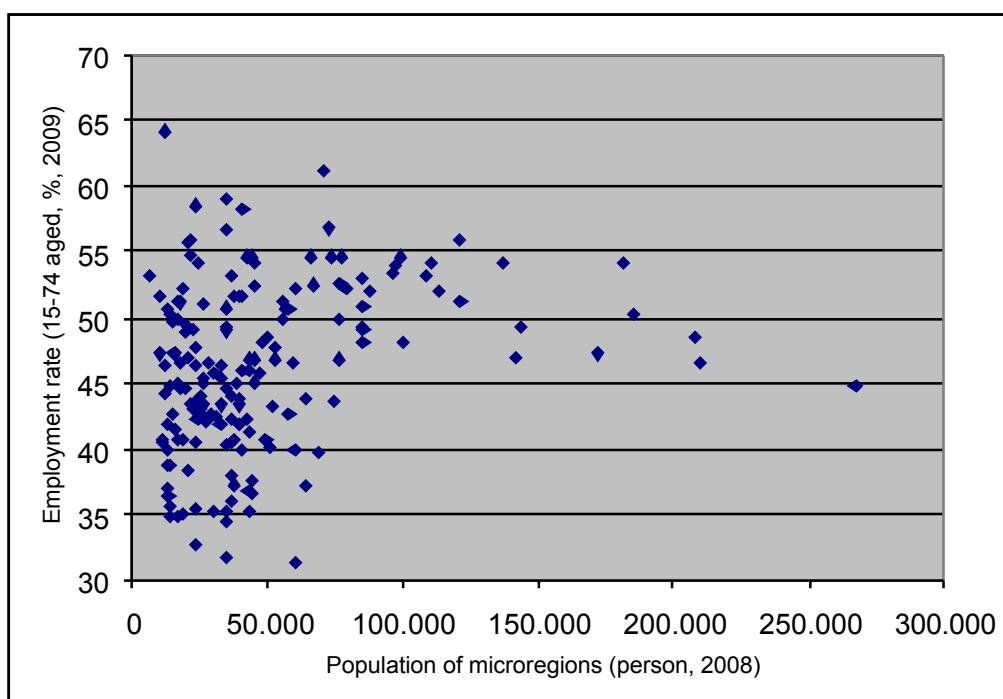
Figure 10. Relations between employment and incomes in microregions



Source: Own calculations of authors based on Állami Foglalkoztatási Hivatal (<http://kisterseg.afsz.hu/index.php>) and KSH Területi Statisztikai Évkönyv.

Examining employment rates in microregions based on their populations, one may get a very diversified picture (*Figure 11*). Employment rates in microregions with less than 85 thousand inhabitants (four fifth of microregions) are distributed evenly, mostly between 35% and 60%. In those 24 microregions with more than 85 thousand inhabitants, employment rates vary between 45 and 55% (in Budapest it is 56.6%). It can be established that the critical mass, population as employees and consumers, as well as more sophisticated urban services are crucially important factors in the evolution of employment.

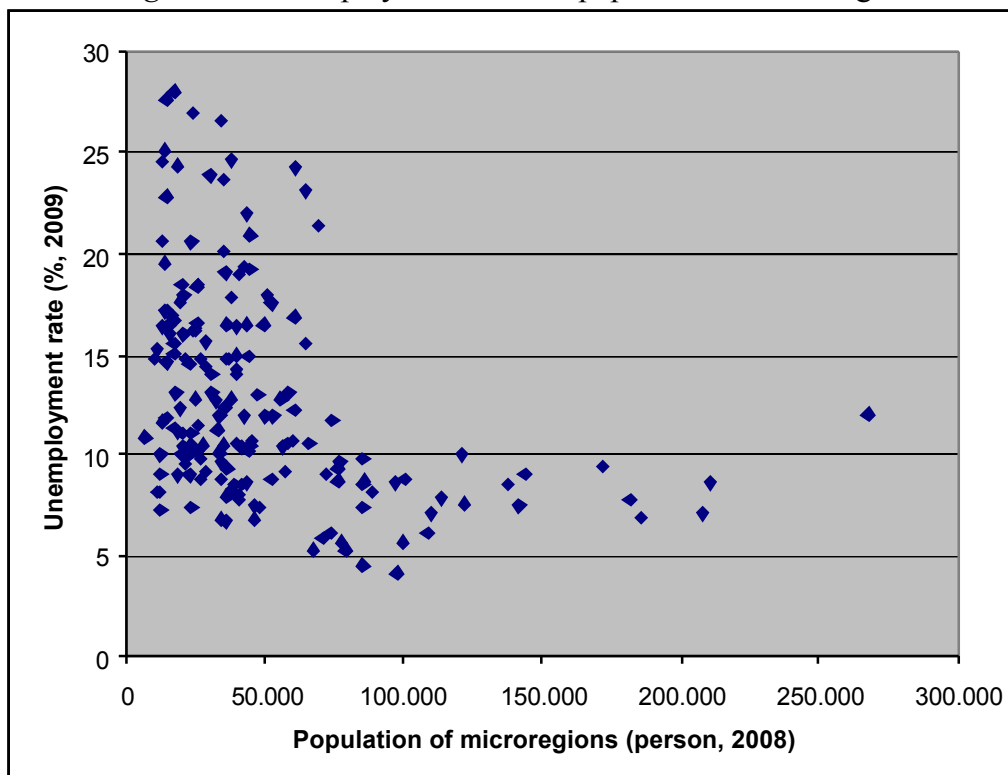
Figure 11. Employment rate and population of microregions



Source: Own calculations of authors based on Állami Foglalkoztatási Hivatal (<http://kisterseg.afsz.hu/index.php>) and KSH Területi Statisztikai Évkönyv.

Note: Without Budapest

Figure 12. Unemployment rate and population of microregions



Source: Own calculations of authors based on Állami Foglalkoztatási Hivatal (<http://kisterseg.afsz.hu/index.php>) and KSH Területi Statisztikai Évkönyv.

Note: Without Budapest

Unemployment rates and the *population of microregions* have an opposite relationship (Figure 12). An important milestone can be seen at 85 thousand inhabitants: more populated microregions have unemployment rates of 5 to 10 %, while less populated microregions have between 7 and 28 %. No influence on this situation can be seen in microregions with less than 85 thousand inhabitants, as these have a similar distribution as larger ones.

Microregional competitiveness can be measured with complex indicator systems by using multivariable statistical methods. A methodology for describing certain elements of the pyramidal model was developed by Lengyel and Lukovics (2006), Lukovics (2008), refined by Lukovics and Kovács (2010). The database for evaluation competitiveness in microregions – and used for multivariable data analysis – was *created in several steps* (Lukovics – Kovács 2010). Initially certain *basic data* were determined, which were available from national statistical databases. This data was used to create *144 potential indicators* along the elements of the pyramidal model. Principal component analysis was used to determine the *78 actual indicators*, which were used for the analysis in the end. During the selection of variables it was very important to find at least one, but no more than 2-3 principal components for each basic category, development factor and success determinant, and their information content should remain at least 70%. After selecting variables 26 principal components were determined. The database was finalized after *standardizing* and *weighting* the actual indicators.

After performing this selection, the *weight of the 78 standardized variables in the pyramidal model was determined* (Lukovics-Kovács 2010). In this process another principal component analysis was performed with all 78 standardized variables of the model. Commonalities of all 78 variables were determined by principal component analysis; by taking the square root of these values, the strength of the relation with the descriptive system of competitiveness was established. Standardization and weighting of the data file was done by using these values as weights for the 78 variables.

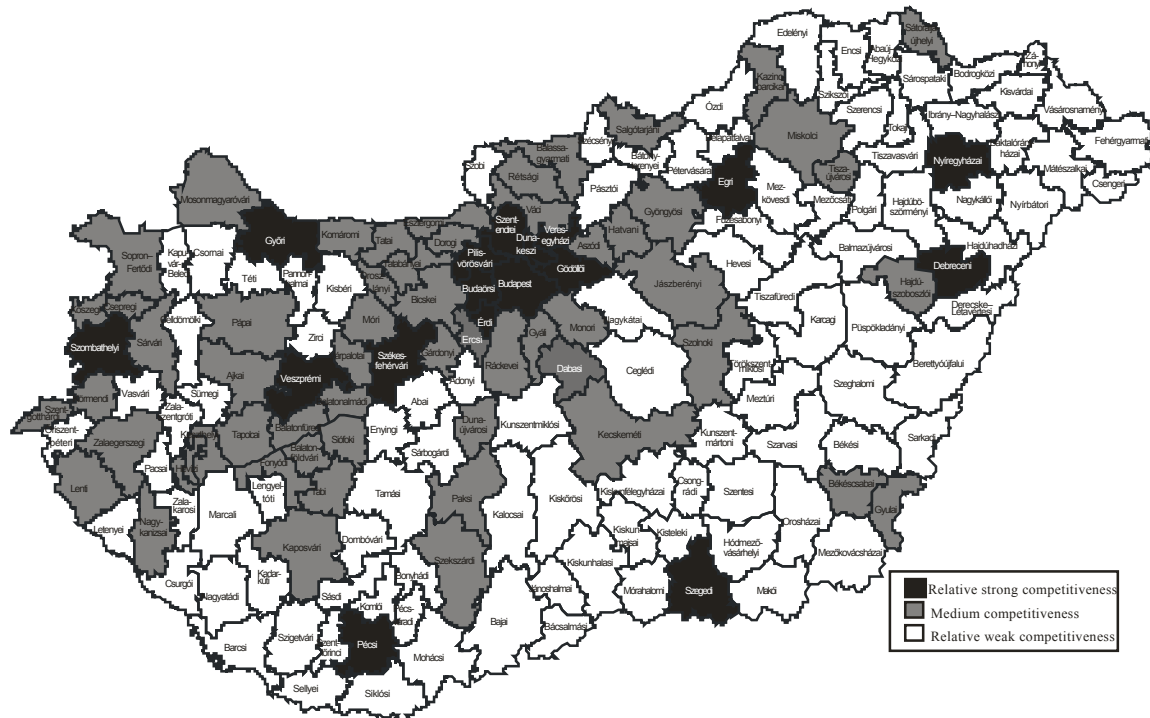
After performing the selection and weighting, a database of standardized, weighted variables was established on the foundations of the unified competitiveness definition and pyramidal model, originating from year 2008. These 78 variables were applied for analyzing competitiveness in microregions by two different methods: cluster analysis and multidimensional scaling.

The 174 Hungarian microregions were classified into three clusters, based on their competitiveness (Lukovics-Kovács 2010):

- microregions with relatively strong competitiveness (19 microregions with Budapest),

- microregions with medium competitiveness (55 microregions),
- microregions with relatively weak competitiveness (100 microregions),

Figure 13 Types of microregional competitiveness in Hungary



Source: Lukovics-Kovács 2010, p. 17.

Locations of strongly competitive microregions can be described by a dual tendency. One group (10 microregions) is concentrated around Budapest, thus maintaining strong links to the prospering business life of the capital and its 2 million inhabitants. The other group consists of other major cities in Hungary representing regional centers of NUTS 2 regions, independently of the regions these are located in. Microregions with medium competitiveness are linked to the capital on one hand, on the other hand these have good access to traffic, e.g. through highways. Being in the vicinity of the Western border has important benefits, microregions located in the Eastern part of the country show weak competitiveness, and improved cases are very rare and atomistic.

5. Microregional clusters and characteristics

Improvement of microregional competitiveness needs to rest on bottom-up strategies; this emphasizes the role of clusters as described in the UFO model. It was stressed during our

investigation into microregional competitiveness, that microregions with 85 thousand or more inhabitants have significantly higher employment rates and lower unemployment than smaller microregions.

The groups of 174 microregions, according to agglomeration economies:

- *Budapest* (2 million population): urbanization agglomeration economies (Jacobs' externalities)
- *24 large microregions with urban center, as city-regions* (at least 85.000 population, sum total 3 million population): localization agglomeration economies (Marshall' externalities)
- *149 small (rural type) microregions* (sum total 5 million population)

By competitiveness level of 24 city-regions (Lukovics-Kovács 2010, *Figure 14*):

- Strong, knowledge-transfer microregions: 12
- Medium, knowledge-transfer microregions: 11
- Weak, neofordist microregions: 1

Further on it shall be examined if these 24 microregions sustain any clusters. Cluster mapping is most frequently done by using the employment *LQ-index (location quotient)*. This measures the under- or overrepresentation of a certain economic activity in the economy of the given region compared to the nation's economy as a whole (Szakálné Kanó 2010, Vas 2009):

$$LQ_{ij} = \frac{E_{ij}/E_j}{E_{in}/E_n} \text{ or } LQ_{ij} = \frac{E_{ij}/E_{in}}{E_j/E_n}, \text{ where}$$

E_{ij} is the number of employees in microregion j and industry i,

E_j is the number of employees in microregion j,

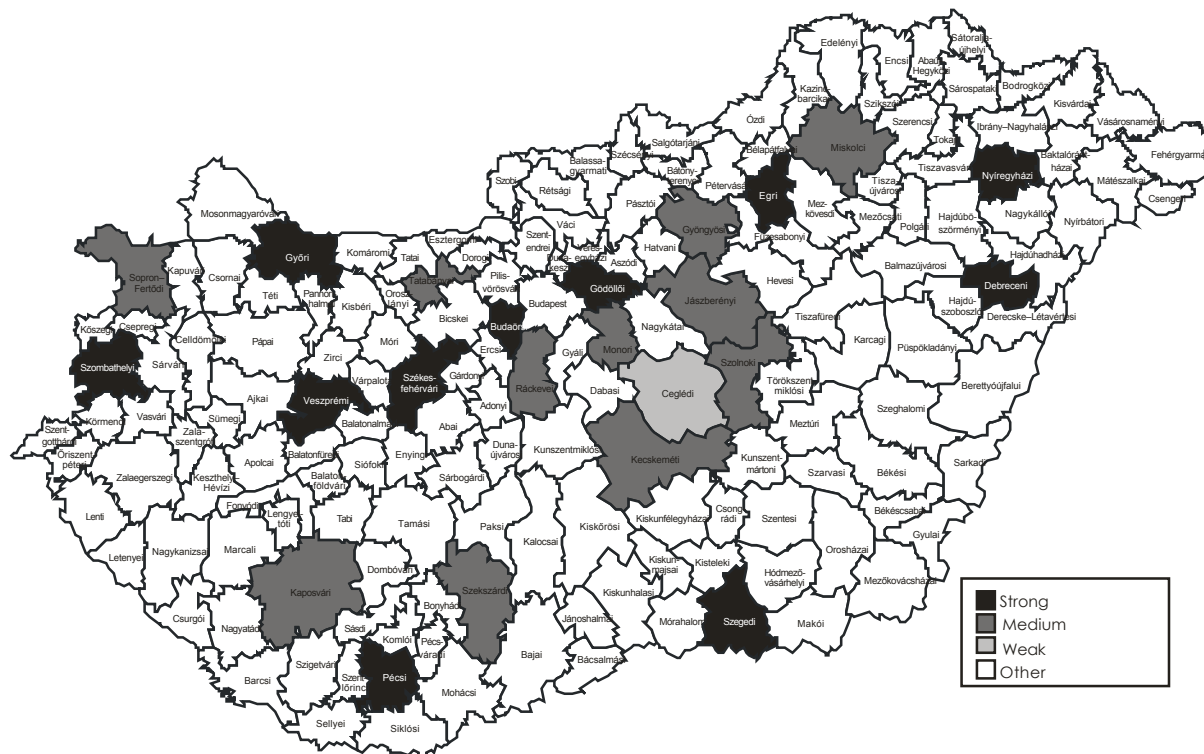
E_{in} is the number of employees in the country in industry i,

E_n is the total number of employees in the country.

A value exceeding 1 means that the given industry's employee count exceeds the national average in a given region. Despite its handicaps, employment LQ has a major role in examining regional specialization and potential clusters. Several investigations were performed in Hungary,

one of the most precise being done by Lengyel and Szanyi (2010), investigating into employment data of 43 subbranches per microregion based on data from 2005.

Figure 14 Competitiveness types of city-regions



In case of the 24 urban microregions, only LQ values exceeding 2 were considered. Among these 24 microregions, only one could be found where no potential cluster can be identified: the microregion of Érd, which is basically a sleeping suburb of Budapest, most inhabitants work in Budapest, driving back and forth each day. Most microregions show 3 to 4 potential clusters (Table 4).

Table 4 Industrial clusters of microregions (LQ>2)

Microregion	Comp. types	Industries LQ>2
Budaörsi	strong	Analytical Instruments, Fishing and Fishing Products, Tobacco
Ceglédi	weak	Agricultural Products, Heavy Machinery, Metal Manufacturing
Debreceni	strong	Apparel, Biopharmaceuticals, Medical Devices, Tobacco
Egri	strong	Apparel, Construction Materials, Forest Products, Medical Devices
Érdi	strong	-
Gödöllői	strong	Analytical Instruments, Automotive
Gyöngyösi	medium	Power Generation and Transmission, Processed Food, Healthcare
Győri	strong	Automotive, Jewelry and Precious Metals, Sporting, Recreational and Children's Goods, Textiles, Plastics
Jászberényi	medium	Heavy Machinery, Lighting and Electrical Equipment

Kaposvári	medium	Forest Products, Power Generation and Transmission
Kecskeméti	medium	Forest Products, Information Technology, Plastics, Processed Food
Miskolci	medium	Heavy Machinery, Other consumer services
Monori	medium	Furniture
Nyíregyházi	strong	Analytical Instruments, Automotive, Footwear, Leather products, Processed Food
Pécsi	strong	Mining, Forest Products, Information Technology, Leather products, Sporting, Recreational and Children's Goods, Public services
Ráckevei	medium	Mining, Heavy Machinery, Processed Food
Soproni-Fertődi	medium	Automotive, Construction Materials, Furniture, Plastics, Other consumer services
Szegedi	strong	Education and Knowledge Creation, Fishing and Fishing Products, Jewelry and Precious Metals, Oil and Gas Products and Services
Székesfehérvári	strong	Automotive, Communications Equipment, Metal Manufacturing
Szekszárdi	medium	Analytical Instruments, Leather products, Sporting, Recreational and Children's Goods, Textiles
Szolnoki	medium	Footwear, Forest Products, Heavy Machinery, Leather products, Sporting, Recreational and Children's Goods, Healthcare
Szombathelyi	strong	Automotive, Footwear, Forest Products, Lighting and Electrical Equipment
Tatabányai	medium	Heavy Machinery, Information Technology
Veszprémi	strong	Automotive, Building Fixtures, Equipment and Services
Zalaegerszegi	medium	Apparel, Furniture, Processed Food, Textiles

Souce: Lengyel – Szanyi, 2010.

Obviously, microregional specialization is often linked to functions of public services, e.g. hospitals or tertiary education institutions can only be found in major cities. Of course, these clusters are only potential clusters, before cluster-based strategies should be make some interviews to investigate network linkages between businesses and institutes.

6. Summary

This study reviewed the most important questions related to regional competitiveness and cluster-based economic development. Globalisation processes, their interregional characteristics and global competition lead to the development of a 'new economic space'. With the emergence of the knowledge-based economy the international division of labour also transforms and the role of regions in the postfordist economy must be reconsidered. Three basic region types can be distinguished that participate differently in the international division of labour. The acceleration of global competition has resulted in the increase of competition among regions, or more precisely, nodal microregions.

Due to the special characteristics of global competition, the concept of regional competitiveness must also be defined. There is abundant literature on competitiveness with

certain well-known approaches, out of which especially the concept of standard competitiveness common in the European Union seems adequate in case of the regions not only for scientific analyses but also for regional economic development. The concept of standard competitiveness is partly linked to the thought of economic growth; therefore, it also leans on theoretical economics, although it also has strong regional political and economic development aspects that brings it close to the questions of business sciences as well.

For the interpretation of regional competitiveness a pyramidal model was established that offers a complex frame for the measurement and improvement of competitiveness. It does not only make a proposal concerning the indicators applicable for measuring competitiveness, but also systematises economic development ideas depending on the types of regions. The logic of bottom-up regional economic development is demonstrated by the UFO model, which connects the approach of competitiveness and the practice of cluster development in the different types of microregions, as functional regions.

The microregions falling in different competitiveness types described in the present paper cannot be handled with a unified economic development action plan. When defining the features of bottom-up economic development strategies it is advisable to depart from the special features of the given region type. In the microregions there are some potential clusters, these traded regional clusters are capable of improving competitiveness and therefore proposed a *cluster-based approach to regional economic development*.

In *knowledge transfer urban microregions* the above mentioned critical mass required for defining a successful knowledge-based economic development strategy is given, however, boundary conditions are not yet available for the successful organisation of innovative clusters. In these sub-regions the development of clusters must be facilitated by improving university training programmes, creating and operating technology transfer institutes, improving the business climate, entrepreneurship and so on.

In *knowledge transfer rural micro* the critical mass necessary for realizing successful knowledge-based economic development is not available, therefore, in this case an industrial restructuring strategy is recommended. Namely, attracting companies with a relatively small number of work force and applying relatively a high level of knowledge not created in the given sub-region to establish their sites (e.g. assembly sites) in the area. Here, industrial restructuring strategy must focus on encouraging agricultural and manufacturing transformation.

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