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An Attempt for the Measurement of Regional Competitiveness in Hungary

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ABSTRACT

The main challenge of regional economic development is undoubtedly to increase the living standard and welfare of local population. Usually the state of development of regions and sub-regions within one country significantly differs. Parallel to the catching-up process of Hungary at the national level, there is another discernible process at the regional level: regional disparities are widening because the growth of the most developed sub-regions is increasing while the less favoured sub-regions are lagging behind. In Hungary, the dominates in development, the Western part is emerging, and the Eastern territorial units, mostly the ones by the boarder are lagging behind. Economic development should not be executed homogeneously, one should take into consideration the attributes and starting conditions of that certain territorial unit. The variety of starting conditions requires different interventions and strategies of economic development from region to region. Territorial units with different level of competitiveness should take variant steps on the road of economic development in order to achieve competitiveness in the global world. Due to their different starting conditions they cannot be developed by the same action plans.

Regarding the fact that development or underdevelopment does not spread evenly in country, we chose to base our empirical research on the smallest spatial unit for which statistical data are still available. Furthermore sub-regions are worth analyzing because nowadays local economic development is attached to local areas and commuting zones that are almost equivalent to sub-regions.

Present paper aims to measure the Hungarian sub-regions alongside development phases, with the help of multi-variable data analyzing methods based on a determined system of viewpoints. We developed a weighting system of the indicators, following the logic of the pyramidal model of regional competitiveness. We are convinced that the presented model and the methodology based on it are suitable for making regional competitiveness measurable. Through this and with the help of statistical data, the competitiveness of any territorial unit of any level can be determined. We think that a suitably analyzed starting situation can contribute to choosing the best economic developing strategy for improving regional competitiveness.

1. On regional competitiveness and its improvement

Today more and more experts dealing with regional science are interested in the analysis of regions as functional regions or nodal regions, also examining factors influencing competitiveness (Maskell at al 1998). Huovari and his co-authors (2001) introduce numerical data on the competitiveness of Finnish sub-regions; however, they do not define implicitly which definition of competitiveness they apply in their analyses. Out of 15 indicators organised in four factor groups they construct a competitiveness index using their own weighting method, which makes possible the ranking of Finnish sub-regions and they provide the competitiveness index for the long and short run.

In his empirical analysis of 133 British counties, Roberts (2003) does not claim to engage in a competitiveness analysis. However, his work is considered relevant for our topic, since it deals with the growth of GDP per capita, one of the favoured indicators of competitiveness using theories of growth in theoretical economics. Devereux et al (2003) examines British town areas although not fully along the dimension of competitiveness but rather along the urban-rural dimension used by us defining and calculating agglomeration indices. Wong (2002) examines British sub-regions from the aspect of economic development: he defines 29 development indicators organised in eleven factors, then with the help of multiple regression models differentiates the sub-regions included in the analysis.

Alexiadis and Tsagdis's work (2005) deals with innovation capacity constituting one basic element of regional competitiveness and the basis of regional economic development in Greece. The authors attempt to numerically describe the spatial differences of R&D work force with the help of an econometric model. Barrios et al (2004) deals with a similar area when introducing the agglomeration effects of industry branches and their modification in time using the example of two countries, Portugal and Ireland. Apparently, the analysis of competitiveness receives growing attention in research related to small regions too.

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. Competitiveness as a collective term has been in use for long, although it is difficult to define. It basically means the inclination and skill to compete, the skill to win position and permanently stay in the competition, what is marked primarily by successfulness, the size of market share and the increase of profitableness.

The most important findings of the abundant literature dealing with the competitiveness of countries may also be applied to interpret the competitiveness of regions (Budd-Hirmis 2004, Camagni 2002, Gardiner-Martin-Tyler 2004, Malecki 2002). Out of theoretical considerations both *Krugman* and *Porter* claim that in the case of macro economies *productivity, its level and rate of growth* is suitable to describe the economic category that is otherwise called competitiveness. "The only meaningful concept of competitiveness at the national level is national productivity" (Porter 1990, p. 6). So in their approach it is the effectiveness of producing internationally marketable products and services that generally defines competitiveness.

Two major issues emerged in the debates aiming at the interpretation of competitiveness: on one hand, *how to define competitiveness* and *what indicators to measure it with*? On the other hand, *how can competitiveness be improved*, which governmental 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. Questions of interpretation, measurement and regional policy related to the concept of competitiveness receive much attention in countries and regions as well.

There were a number of attempts to define the *new notion of competitiveness* according to new global competition conditions in the mid 1990s. Particularly important examples include the proposals put forward by the US Competitiveness Council, the OECD and the European Union (Begg 1999; Camagni 2002, Budd-Hirmis 2004). One of the first attempts to create the notion is the European Union (EC 1999, p. 75) working definition of regional competitiveness.

> "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".

Similarly the *standard (extended) notion of competitiveness* in the Second Cohesion Report of the EU (EC 2001, p. 37):

> "Standard definition of regional and national competitiveness has begun to emerge, which relates to the achievement of 'high and rising standards of living and high rates of employment on a sustainable basis'".

At the same time, there is a *growing consensus* that a standard notion of competitiveness can be found to describe processes of the globalizing economy for companies (microlevel), sectors and regions (mesolevel) as well as for national economies (macrolevel). The standard (common) concept of competitiveness has been partly developed in order to serve as a widely accepted theoretical definition which can be measured and also be used by regional development policies (Gardiner – Martin – Tyler 2004, Lengyel 2003a, Maskell et al 1998). Competitiveness is intimately bound up with successful economic development.

The standard definition refers to "relatively high income". This can be measured by means of the per capita GDP and the GDP growth rate. A high employment level is in turn indicated by the rate of employment. These two indicators can be measured independently from one another, but as is well known the per capita GDP can also be expressed as follows (EC 1999, p. 75, Lengyel 2004):

$$\frac{GDP}{total \cdot population} = \frac{GDP}{employment} \times \frac{employment}{working-age \cdot pop.} \times \frac{working-age \cdot pop.}{total \cdot population}$$

The first fraction on the right-hand side of the formula is approximately equal to *labour productivity*, the second to the *rate of employment* and the third fraction, the *age distribution of the population*. Given the standard definition of competitiveness, no unique indicator of regional competitiveness can be found. It is interpreted rather as a combination of closely connected, well-measurable and unambiguous traditional economic categories:

- per capita GDP of the region (otherwise regional growth),
- labour productivity of the region,
- employment rate of the region,
- economic openness of the region (exports and imports).

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* (EC 2001). In other words, competitiveness means economic growth driven by high productivity and a high employment rate. The standard concept of competitiveness

basically expresses balanced regional economic growth. If the employment rate is high, then sooner or later the *living standard* will also increase.

Measuring regional competitiveness has been traced back to four related economic categories: income generated in the region, labour productivity, employment rate and the openness. 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. The *pyramidal model of regional competitiveness* seeks to provide a systematic account of these means and to describe the basic aspects of improved competitiveness (Gardiner-Martin-Tyler 2004, Lengyel 2000, 2004).

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 (Lengyel 2003b). 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 1996).

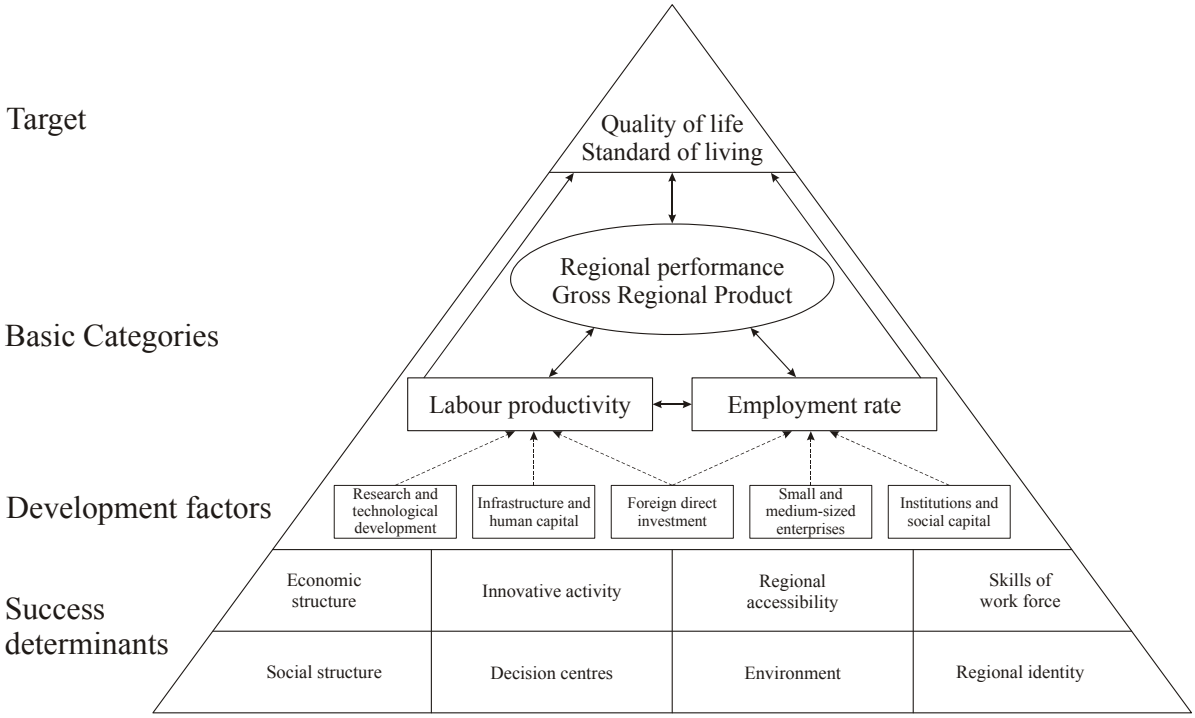
Three levels can be distinguished with regard to the objectives of regional development programming and the various characteristics and factors influencing competitiveness:

- *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

When characteristics determining competitiveness are placed on a chart one obtains the 'pyramidal model' of regional competitiveness (*Figure 1*): the components of long-term success are to be found in the base, the middle layer is constituted by the development (programming) factors, the basic categories included in the standard definition of revealed competitiveness are located one level higher, while the standard of living and welfare of the region's population, the ultimate objective, forms the peak of the pyramid.

Competitiveness depends on a wide range of factors and conditions. The *five programming factors* (priorities of the regional development strategy) of pyramidal model underlying competitiveness included in the Sixth Periodic Regional Report of the EU (EC 1999), however, exceptionally significant (Lengyel 2003b, 2004). These development factors shape, to varying extent, economic output, labour productivity as well as employment. Improving individual programming factors forms the object of regional policies. They are likely to improve the competitiveness of regions directly and in the short run by means of regional partners, local institutions.

Figure 1. The pyramidal model of regional competitiveness



Source: Lengyel (2003, 2004).

Success determinants with an indirect, often spontaneously, long-term impact on regional competitiveness cover a wide range of variables (Lengyel 2003b, 2004). At the same time, there is a growing agreement with regard to the success determinants. Enyedi (1996, pp. 62-64) lists ten important determinants underlying regional success, Begg (1999, pp. 802-04) highlights four determinants and the Sixth Periodic Regional Report of the EU (EC 1999, p. 80) mentions four determinants as well. Surveys on regional success are characteristically based on an analysis of a considerable amount of statistical data (usually factor analysis). They use these figures to determine the connection between certain indicators and economic performance (generally expressed as GDP per capita).

Needless to say, the above success determinants are tied up with one another and can partly overlap as well. It is to be emphasized that the two bottom levels of the model build on one another: economic structure depends on the social constitution of the region, the innovative activity will be shaped by company and institutional headquarters, better regional accessibility will tend to have negative effects on the environment, and the regional identity will have an impact on the qualifications and motivation of the workforce.

In our opinion, the standard definition of competitiveness is well-suited to measure and improve the competitiveness of regions. The standard notion of competitiveness can be widely used and is applicable to all basic economic units, for instance to regions. It is in essence a means to assess economic growth and development, while it also constitutes the main objective of economic policy under the new and changing circumstances.

By combining various conceptions of competitiveness one can obtain the pyramidal model. This includes not only indicators to measure revealed competitiveness, but also programmes underlying improved competitiveness. The latter factors can be divided into two groups: those having a short-term impact (for regional programming), on the one hand, and the success factors, on the other.

2. Possibilities of Creating a Typology of Regions

The regional science literature includes various different typologies of regions, many of which may also be linked to competitiveness. Our research departed from the following:

(a) the approach designed by the University of Cambridge to create the typology of European regions,

(b) the European Union's region types from two aspects,

- the two types used in the USA,

- one of OECD's typologies,

(c) Porter's competitive development phases,

(d) new region types emerging from the adaptation of fordist and neoforditst cycles to regional processes,

(e) furthermore, region types defined by Hungarian legislation in order to reduce regional disparities.

On behalf of the European Union a large scale research project directed by the University of Cambridge concluded in November 2003 analysed 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 region 'theoretical' types were distinguished based on two dimensions, density of population and the growth rate of GDP (Martin 2003, p. 6-23):

1. *Non-productive regions:* the most underdeveloped regions according to the typology, with low income level. These regions are usually situated on the periphery, are unattractive rural areas with an insignificant rate of foreign working capital investment.
2. *Regions as production sites*: regions characterised by medium income level. These regions typically build upon cheap input; their competitiveness is mainly defined by basic infrastructure, cheap building sites, lack of crowdedness and cheaply available human resources. These features are optimal for multinational assembly companies. These regions have a medium density of population and an average growth rate of GDP.
3. *Regions as sources of increasing returns*: regions with high growth rate but medium density of population fall in this category. Their competitiveness is defined mainly by the qualification of work force, availability of contractors and market size. Usually, some strategic sectors ensure the region's welfare.
4. *Regions as hubs of knowledge*: these regions are characterised by high and sustainable GDP growth and relatively high density of population. They are open to international relationships, offer good career opportunities, what attracts the most talented work force. This region type often has a high level of R&D and innovation. Its competitive advantage derives mostly from the outstanding quality of human resource, the simple availability of international markets and local access to business services.

In its present (2000–2006) and upcoming (2007–2013) programming period, the European Union equally places special emphasis on the assistance of less developed regions. Funding underdeveloped regions remains the most important segment of the cohesion policy, therefore, based on the criteria defined in Objective 1 of the Structural Funds two regional types of NUTS-2 level may be distinguished:

- *Underdeveloped regions*: those regions belong here that have less than 75% of EU average GDP per capita calculated in PPS considering the average data of the preceding three available years.
- *Not underdeveloped regions*: those regions fall in this category whose GDP per capita calculated in PPS considering the average data of the preceding three available years exceeds 75% of the EU average.

Furthermore, according to the European Union's increasingly widespread view, within NUTS-2 level regions mainly large towns and their catchment area participate successfully in global competition, while predominantly rural regions situated among them do not. The classification of regions reflects this approach:

- *Urban regions*: nodal regions made up of large towns and their catchment areas are the main carriers of development.
- *Rural regions*: they fill in the less developed space among urban regions.

The urban-rural approach is usually not tied to administrative borders; it reflects the aspect of nodal regions. No implicit, generally accepted limiting criterion exists between the two region types, although in practice population over 50 thousand is commonly accepted.

Two region types based on identical logics (CBSAs: core-based statistical ares) were distinguished in the United States as well. In both cases a core region was defined meaning the residence of the majority of those living in the region. The catchment area constituting a high level of economic and social integration with the core region was also limited with the help of various indicators. The two types are (OMB 2000):

- *Metropolitan regions*: at least 50 thousand inhabitants live in the core region,
- *Micropolitan regions*: at least 10 thousand but less than 50 thousand inhabitants live in the core region.

Similarly to the few typologies above, one of OECD's working documents also considers the concentration of population in the region as a limiting criterion in creating its region types. For examining the development of regions and lower agglomeration level, OECD suggests three region types. The classification is mainly based on population density data (OECD 2001):

1. *Predominantly rural regions*: more than half of the population live in areas with population density of less than 150 people.
2. *Intermediate regions*: between 15 and 50% percent of the population live in areas with population density of less than 150 people.
3. *Predominantly urban regions*: less than 15% of the region's population live in areas with population density of less than 150 people.

Moreover, if a region includes at least one town with at least 200 thousand inhabitants, it is automatically classified as an intermediate region, while if it has a town with more than 500 thousand residents, it automatically qualifies as a predominantly urban region.

As early as 1990, Porter claimed that instead of the theory of *comparative advantages*, the analysis of countries' international specialization must rely on that of *competitive advantages* (Porter 1990). Comparative advantages cannot explain the improvement of the economies of scale, companies' networks and strategic alliances, the flow of production factors among countries, the growing significance of technology transfer, and so on. Based on competitive advantages, he classified countries in three groups (Porter 1990, 2003b):

1. *Factor-driven economy* (low-income countries/regions): globally competing companies compete with cost advantages (available labour force with low wages) based on *cheap input costs* (natural resources, agriculture). The quality of technology is low and these economies purchase it from other countries (it derives from imports) instead of developing it.
2. *Investment-driven economy* (medium-income countries/regions): modern technology is present also through foreign active capital. Advantages deriving from the economies of scale increase and productivity improves radically, however, the competitive advantages of global companies mainly come from *improving the effectiveness* of mass production.
3. *Innovation-driven economy* (high-income countries/regions): companies not only purchase technologies but also develop new ones that mainly tied to producing *innovative products and services*. The success of companies undoubtedly depends on innovation and companies can only produce high wages with the help of innovative activities.

Until the 1970's territorial processes could be described by fordist features, while subsequently the regional processes of developed capitalist countries entered the postfordist stage constituting a new development phase. The extension of the fordist-postfordist cycles result in such region types that are based on today's predominant global tendencies, the upvaluation of invisible property elements, the growing importance of knowledge, and so forth. Based on their role in knowledge-based economies and competitive advantages three region types can be distinguished (Lengyel 2003, 2005):

1. In *neofordist regions* (relatively underdeveloped region type): region with low income, the traded companies operating in the region compete with cost advantages (e.g. cheap work force, tax discounts). The region's companies utilize purchased technology, usually with significant delays.
2. In *knowledge transfer regions* (medium developed region type): region with medium income, technology transfer assumes a significant role, the region's traded companies buy developed technologies, but do not yet elaborate innovations. They usually create industrial parks.
3. In *knowledge creation regions* (relatively developed region type): region with high income, the source of companies' competitive advantages lies in the creation of innovation results, they predominantly apply technologies developed by them. Companies have successful collaborations with universities and finance complex research programs. In many places high tech companies are concentrated in scientific parks.

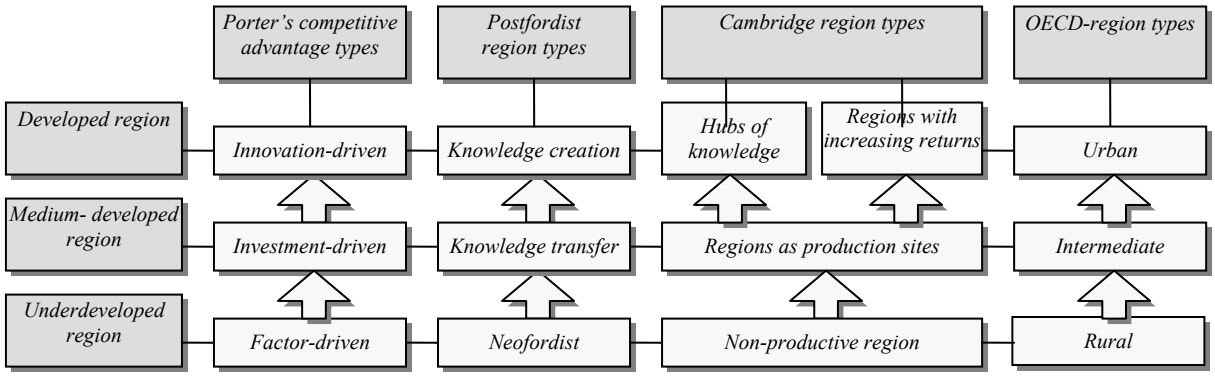
In its Resolution No. 24/2001 (IV. 20.) OGY of Parliament, Hungary defined three types of statistical sub-regions. In the classification of regions demographic, employment, economic, infrastructural supply and other special indicators were considered:

1. socially-economically underdeveloped regions,
2. regions of industrial restructurisation,
3. rural development regions.

In Hungary Act LXXV of 2004 on regional development also defines different development types of regions:

1. *regions of indutrial restructuralisation:* those work force market catchment areas with unproportionate industrial structure where unemployment rate is high, and the rate of industrial employees is high, too,
2. *regions of agricultural rural development (rural regions):* those regions where the rate of agricultural employees is significant and the rate of population living in villages and small towns is high,
3. *innovation centres:* those settlements with adequate production and intellectual background and network of relations that facilitate the development, restructurisation and renewal of economy in a greater region.

Figure 2: Comparison of the results of some highlighted typologies of regions



Source: own construction based on Lengyel (2003, 2005) and Martin (2003).

The typization of regions is based on different aspects, but *three or four region types* are usually distinguished (*Figure 2*). In the typology of Hungarian sub-regions in terms of competitiveness we also made an attempt to create three, approximately homogeneous groups of regions. The above described work in the field of region typization also highlighted that in classifying region types in development phases special attention must be paid to urbanisation, or rather its geographical concentration. Therefore, we also distinguished urban and rural sub-types in three region types.

3. Indicators of the territorial competitiveness in Hungary

The basic categories can be used to measure regional competitiveness: GDP per capita, labour productivity, employment rate and openness. There are seven NUTS-2 regions in Hungary each consisting of 3 counties (*Table 1* and *Figure 3*). Regional GDP at purchasing power parity (PPS) has been recorded since 1996 in Hungary (Lengyel 2004).

Table 1 Territorial levels of Hungary

Level of territorial units	Number of territorial units
NUTS 2 = region	7
NUTS 3 = county	19 + Budapest (capital)
NUTS 4 = subregion	167 + Budapest (capital)

Figure 3 Regions and counties in Hungary

Since 1995, the beginning of the second phase of the transition, Hungary has experienced significant economic growth; the average rate of growth is 4 % per year (*Table 2*). This rate of growth exceeds that of the annual average in the EU-15, which in this period was 2.5 %. Owing to the fast development Hungary's GDP per capita (PPS) reached 60 % of the EU-25 average in 2003.

Table 2 The purchasing power (PPS) adjusted GDP per capita relative to the EU-average in %

Region, County	EU15=100		GDP growth (annual average % change), 1995-2001	EU25=100	
	1995	2001		2002	2003
Hungary	46.0	51.5	4.0	58.6	59.9
Central Hungary	66.4	81.0	5.2	96.0	96.5
Central Transdanubia	41.6	48.0	4.6	52.0	55.4
Western Transdanubia	47.4	53.6	4.3	60.6	64.4
Southern Transdanubia	37.6	38.7	2.6	42.8	42.9
Northern Hungary	33.5	33.7	2.3	37.3	38.3
Northern Great Plain	32.8	34.2	3.0	37.7	39.1
Southern Great Plain	38.3	36.9	1.6	40.4	40.7

Source: Eurostat

The regional distribution of *GDP per capita* has been strongly unequal. Three regions (Central Hungary, Central Transdanubia, Western Transdanubia) actually began to reduce the gap between them and their Western European counterparts with a dynamic growth of approximately 4-5% a year in the period mentioned. The Central Hungarian region with Budapest almost reaches the EU-25 average since in 2003 its GDP per capita was 96.5 %. These three regions with dynamically growing economies constitute one block situated in the northwest of Hungary between Budapest and the Austrian border. The economic growth of the other four regions remained at a yearly 1.6-3%, which is more or less around the EU average or falling slightly below. These regions are situated south and east of this area. Regional data clearly show that in Hungary there are great and constantly growing territorial differences among the regions.

Regional growth depends on a combination of *employment rate* and the *labour productivity*. In Hungary the *employment situation* has improved parallel to the economic growth beginning in 1995 (*Table 3*). However, in 2004 the employment rate of 56.8 % shows considerable lag behind the EU-15 rate of 64.2 % and the EU-25 rate of 62.8 %. The regional differences within the country were similar in the case of employment as in terms of economic output (GDP per capita). In the three developed regions employment reached 60 % in 2004, while the same figure was 50 % in the four less developed ones. In the developed regions the rate of unemployment was approximately 5 % while in the less developed areas it is 6-10 %.

Table 3 Employment rate and labour productivity of regions

Regions, counties	Employment rate (population aged 15-64, %)			Unemployment rate (%)		
	1998	2004	Difference between 2004 and 1998	1998	2004	Difference between 2004 and 1998
Hungary	53.6	56.8	+3.2	7.8	6.1	-1.7
Central Hungary	57.3	62.9	+5.6	5.6	4.6	-1.0
Central Transdanubia	55.7	60.3	+2.6	6.7	5.6	-1.1
Western Transdanubia	61.6	61.4	-0.2	6.1	4.6	-1.5
Southern Transdanubia	51.6	52.3	+0.7	9.4	7.3	-2.1
Northern Hungary	46.5	51.6	+5.1	12.0	9.7	-2.3
Northern Great Plain	46.7	50.4	+3.7	10.8	7.2	-3.6
Southern Great Plain	54.2	53.6	-0.8	7.0	6.3	-0.7

Source: Eurostat

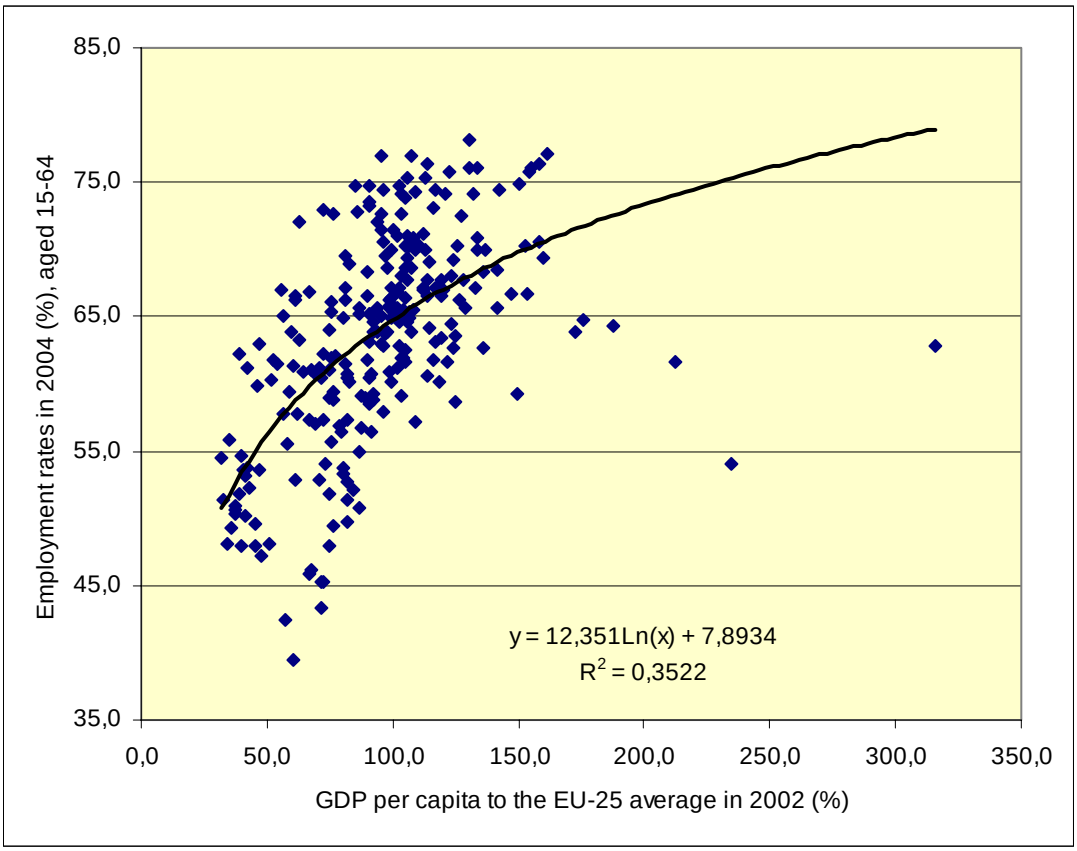
The *'Hungarian employment paradox'* is apparent: the rate of employment and unemployment are both low (Lengyel 2004). This contradiction is partly caused by the fact that many of those who lost their agricultural or manufacturing industry workplaces at the beginning of the 1990's, in the first phase of the transition, became disability pensioners below retirement age, their number in 2004 was 461 thousand. At the same time, the number of unemployed people is also 350-380 thousand. Therefore, owing to social aspects and socio-political considerations, approximately 10 % of the working age population disappeared from the labour market, especially in the less developed regions.

After 1996 *labour productivity* improved in all of the regions, almost parallel to the growth rate of the GDP per capita. Between 1996 and 2002 Central Hungary experienced a growth of 50 %, while in the Southern Great Plain this was 24 % and in the rest of the regions

29-42 %. So this growth was almost twice faster in the developed regions than in the less developed ones. Consequently, the territorial differences apparent in labour productivity are rapidly increasing in Hungary.

Performance in the *global competition and openness* can be described well with the help of data on *exports and international tourism*. In 2003 the three developed regions produced 70 % of Hungarian manufacturing exports, while the contribution of the Southern Great Plain region was only 6 %. The basic figures of regional competitiveness show that the growth and competitiveness of Hungary's economy depends on three regions and mainly on the economy of the capital. The growth of the other four regions is slow; their employment and labour productivity is equally low.

Figure 4. Employment rate and GDP per capita (PPS) in the EU-25 NUTS-2 regions



Source: own construction based on Eurostat (www.epp.eurostat.cec.eu.int/)

The economic development of Hungarian regions (GDP per capita) is in harmony with the size of employment rate, all of them are situated close to the regression curve (*Figure 4*). Except for the Central Hungarian region (Budapest) the other six regions are among the EU's less developed regions with relatively low employment rate.

The *economic structure* of the Hungarian regions are characterised by a relatively low rate of the service sector (*Table 4*). In the Southern Great Plain region 14.2 % of the employed population works in the agriculture with low effectiveness. In the other Hungarian regions agriculture has already lost its importance and is replaced by the industry or service sector with much grater labour productivity.

The other important factor lies in the *educational level of employees*. Except for the Central Hungarian region where the rate of people with degrees is similar to the EU average;

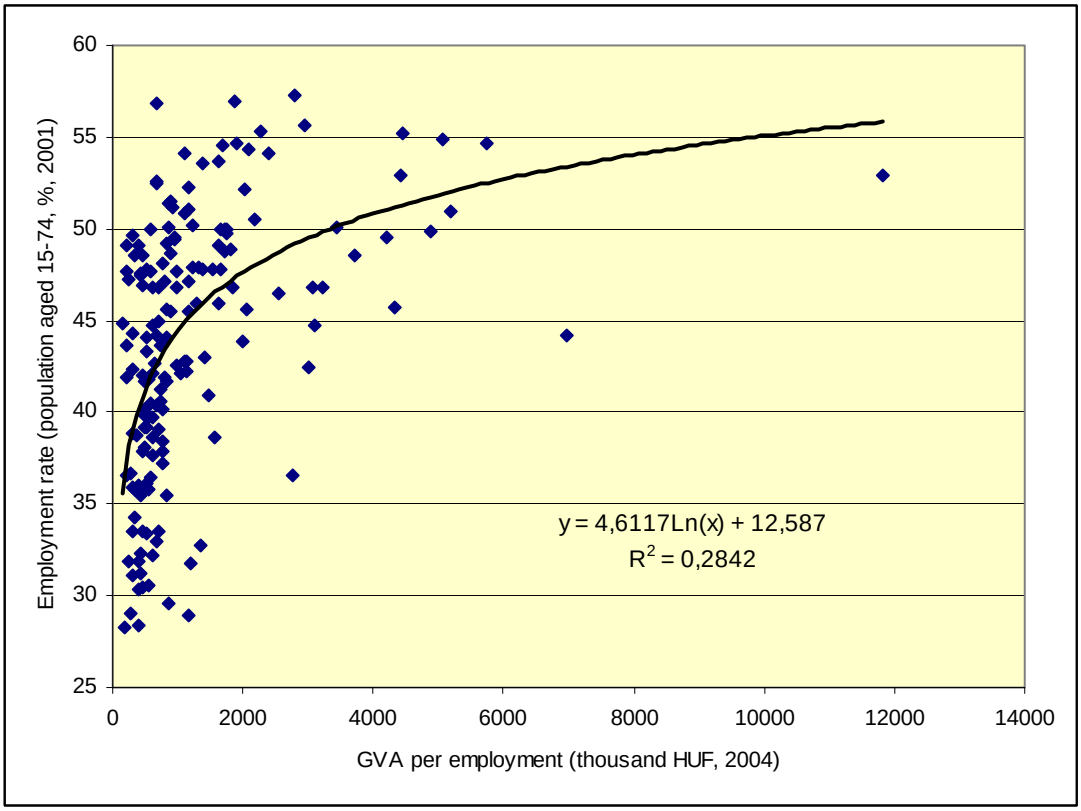
in the other six regions this figure reaches about half of the EU average. This means that there is little qualified work force, consequently, it is difficult for companies situated here to successfully participate in knowledge-based economic competition: structural change has not happed in the region and the educational level of the workforce is low.

Table 4 Employment and education of persons

	Employment by sector (% of total), 2002			Educational attainment of persons aged 25-64 (% of total population), 2002		
	Agriculture	Industry	Services	Low	Medium	High
EU-15	4.0	28.2	67.7	35.4	42.9	21.8
EU-25	5.4	28.8	65.8	32.6	46.7	20.8
Hungary	6.0	34.2	59.8	28.4	57.3	14.3
Central Hungary	1.8	26.3	71.9	20.7	57.8	21.5
Central Transdanubia	5.7	44.6	49.6	28.9	59.2	12.0
Western Transdanubia	5.5	42.0	52.5	26.9	60.8	12.2
Southern Transdanubia	9.8	33.8	56.3	32.7	56.5	10.8
Northern Hungary	4.3	39.9	55.8	32.4	56.3	11.3
Northern Great Plain	7.5	33.8	58.8	34.3	54.2	11.5
Southern Great Plain	14.2	33.0	52.8	32.4	57.0	10.5

Source: Eurostat

Figure 5. Employment rate and labour productivity of the sub-regions (NUTS-4)



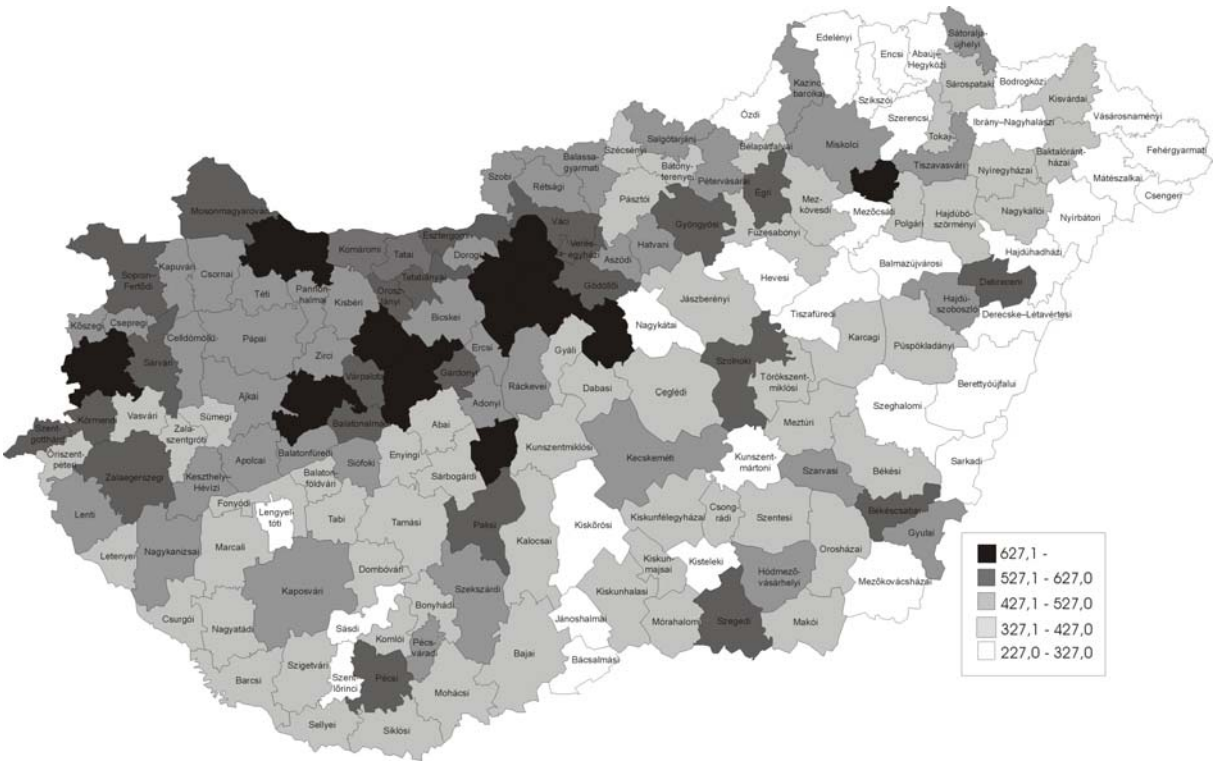
Source: own construction based on HCSO

In sum, there are significant differences in the competitiveness of Hungarian regions: three regions can be said to have displayed improving competitiveness, whereas the

economies of the other four have stagnated. Both the absolute value and the growth rate of employment and labour productivity have contributed to leveraging the competitiveness of the three rapidly developing regions. They have already become an integral part of international trade, while the other four continue to export at relatively low levels.

In Hungary territorial differences among regions are great and increasing. Compared to regions in case of a transitional country's *NUTS-4 sub-regions* differences in terms of development, especially those among towns and villages are obviously larger. In terms of *labour productivity* (GVA per employment) and *employment rate*, the two basic indicators of competitiveness, a distinct picture unfolds (*Figure 5*). The employment rate of the 168 sub-regions has an almost totally balanced distribution between 30-55 %. On the contrary, considering the values of GVA per employment sub-regions show a special picture: about three-fourths of them have identical values not reaching 1500 thousand HUF. The remaining one-fourth represented by the small regions of larger towns has strong variance.

Figure 6. Personal income per capita by sub-regions (2003, thousand HUF)



Source: own construction

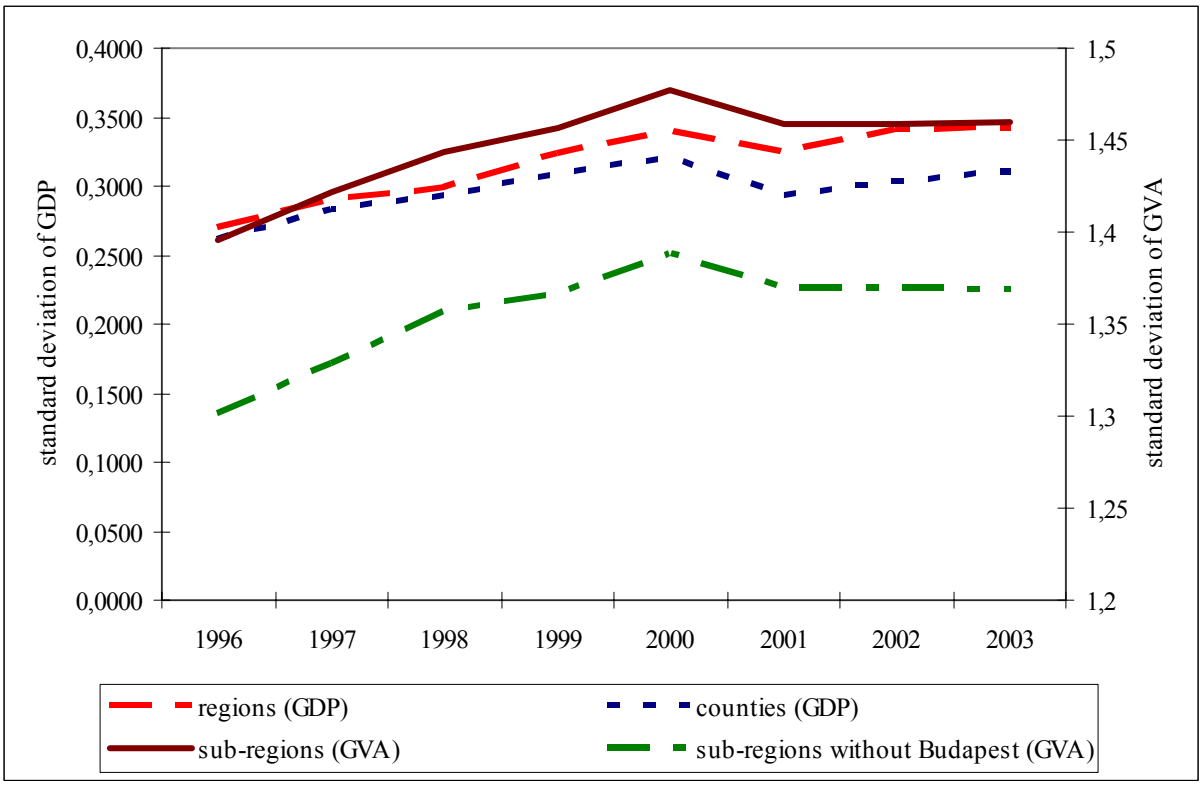
Hungary's *structure of settlements* is characterised by the fact that except for Budapest having 2 million inhabitants together with its catchment area, no other large town exists; regional centres are towns with 150-200 thousand residents. Consequently, two-thirds of the population live in rural areas, villages or small towns.

The special features of the structure of settlements are also shown by the differences of sub-regions in terms of *personal income per capita* (*Figure 6*). In the capital, in regional centres and some county towns incomes are high, while in other areas they are almost equally low. The difference between the Western and Eastern regions is traceable among sub-regions too: in the capital and its surroundings and in Western Hungary incomes are higher, while South of Lake Balaton and East of the Danube they are significantly lower. Continuous

regions with especially low incomes are situated along the Hungarian-Romanian and Hungarian-Ukrainian borders.

The differences of regions, counties and sub-regions experienced continuous growth from 1996 until 2000, and then this process slowed down (*Figure 7*). This means that *no signs of convergence* can be noticed on any of these territorial levels. There is development in each region, county and small region, incomes are increasing, but in a particularly unbalanced manner (*Tables 5-6-7*).

Figure 7 Standard deviation of GDP/GVA per capita



Source: own construction
Note: by natural logarithm

We have analyzed the competitiveness of Hungarian regions by standard notion. The most important findings have been that the economies of three Hungarian regions have developed faster than the EU-average. These regions have been found to catch up more and more with their Western counterparts (especially in the region of Central Hungary). The economies of the other regions have stagnated. Consequently, statistical findings on Hungarian regions make it clear that the high economic growth of the Hungarian economy has been generated exclusively by the improving economic performance of three regions. Only these regions can be called competitive with a per capita GDP growth above the EU-average and labour productivity and employment rates exceeding the national average. The remaining four regions cannot be said to be competitive given their economic stagnation, insignificant growth rates, low levels of employment and labour productivity.

Table 5. Some descriptive statistics of GDP per capita (PPS) of the Hungarian regions

Year	*Number of cases*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*	*Median*
1996.	7	7907,3	2334,0	5937	12614	6976
1997.	7	7664,7	3677,1	1742	13708	7162
1998.	7	8939,3	2834,9	6561	14330	7483
1999.	7	9695,6	3331,2	6773	15960	8212
2000.	7	10278,4	3832,2	7106	17555	8346
2001.	7	10882,6	4043,8	7808	19057	8855
2002.	7	11094,0	4447,7	7902	20329	9063
2003.	7	11534,0	4523,3	8198	20643	9176

Table 6. Some descriptive statistics of GDP per capita (PPS) of the Hungarian counties

Year	*Number of cases*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*	*Median*
1996.	20	7505,8	2341,7	4909	15926	6693,0
1997.	20	7978,5	2661,7	4846	17214	7246,0
1998.	20	8465,1	2902,8	5490	18060	7564,0
1999.	20	9159,4	3326,5	5770	20152	8378,0
2000.	20	9663,3	3877,1	6011	22792	8659,0
2001.	20	10270,2	3853,3	6727	24337	9256,0
2002.	20	10421,8	4210,3	6704	26296	9384,5
2003.	20	10877,3	4340,7	6931	26642	9612,0

Table 7. Some descriptive statistics of GVA per capita (at 1997 prices) of the Hungarian sub-regions

Year	*Number of cases*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*	*Median*
1997.	168	199,3	309,2	18,7	2934,9	115,2
1998.	168	207,0	328,0	17,6	3137,5	117,8
1999.	168	218,7	325,7	17,5	2818,5	125,7
2000.	168	230,7	309,0	20,7	2580,8	137,9
2001.	168	234,6	295,3	21,5	2625,9	145,1
2002.	168	251,9	310,6	21,7	2867,8	151,7

4. An Attempt for the Measurement of Competitiveness in the Case of Sub-regions

The measurement and typisation of competitiveness in NUTS-4 level regions is performed with a complex *system of indicator numbers* where defining and choosing variables is a key task. In choosing indicators we follow the logic of the pyramidal model and perform a complex analysis with the help of multivariate data analysing methods. According to our expectations the statistical data base defined by basic categories, basic elements and success factors can be used to analyse the complex competitiveness of small regions.

We attempt to use pyramidal model and describe each basic category, development factor and success determinant with at least three or four variables. Date collection was performed using the Hungarian Central Statistical Office's database. Since on the level of NUTS-4 sub-regions Gross Domestic Product (GDP) is not measured in Hungary, this is

substituted by the content-wise similar indicator of *Gross Value Added (GVA) per capita*[1]. All data are taken from the same year of 2003[2], since no later GVA data were published in Hungary until the date of our analysis. A set of further two or three related indicators per basic category are added to the three ones favoured according to the logic of the pyramidal model (*GVA per capita, labour productivity and employment rate*). The favoured indicators of the basic categories and the indicators of development factors and success determinants were selected based on the concept of standard competitiveness, what resulted in 63 indicators (*Figure 8*).

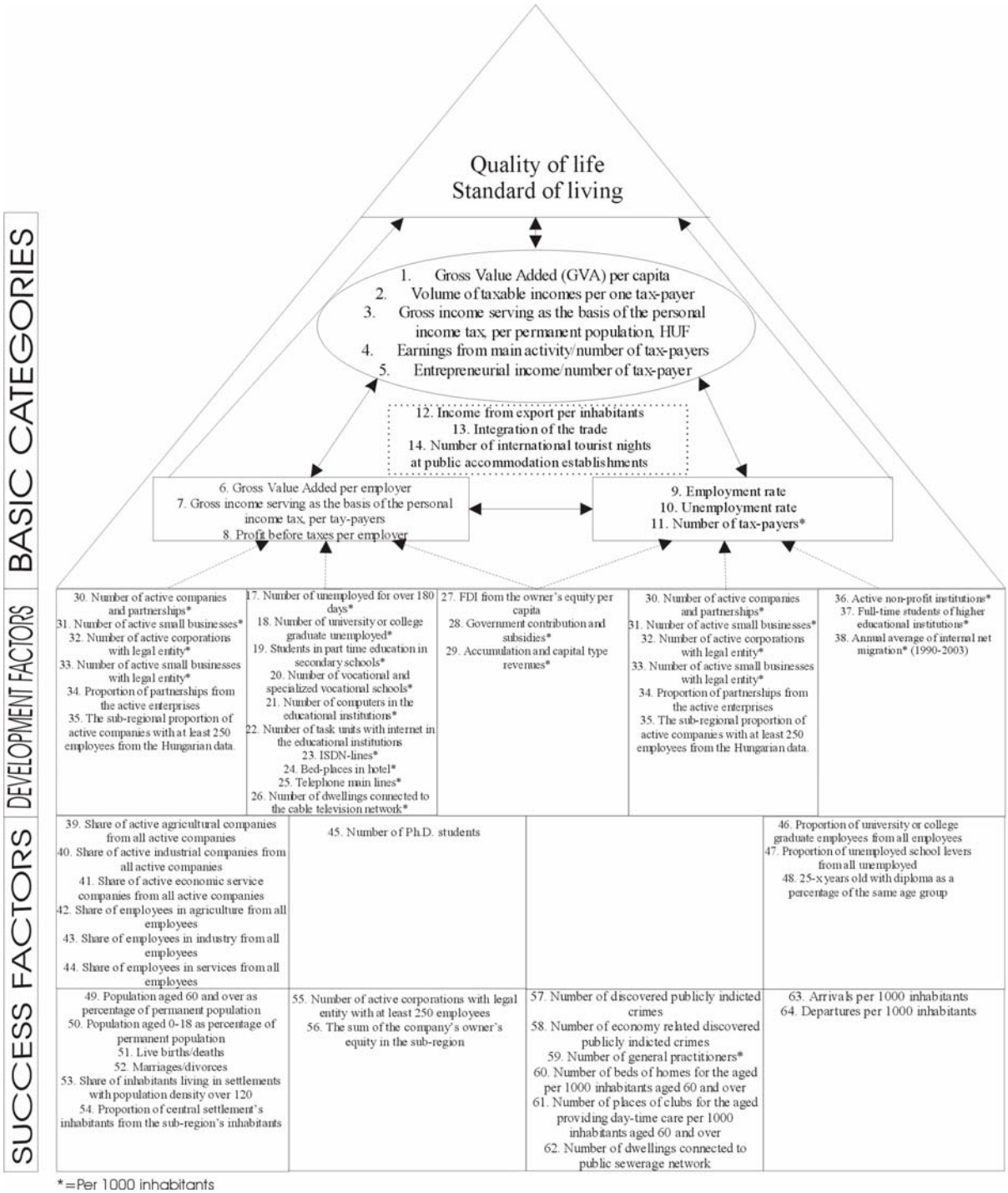
In the next step of the analysis, using the system of indicators we organized the 168 Hungarian sub-regions in homogeneous groups based on their competitiveness level. Out of the available statistical multivariate analysis techniques two methods were applied: *multidimensional scaling* and *cluster analysis*. The two methods have different ground states: as a data reduction method departing from a distance matrix, multidimensional scaling reaches its output, a *figure illustrating correlations*, from which potential clusters hopefully emerge with *the significant reduction of the number of dimensions*. At the same time, cluster analysis defines *cluster*s from the 63 variables mentioned above *without reducing the number of dimensions*. In case of both methods the Euclidean distance between pairs of objects was taken as basis in measuring the similarity of the objects. Version 13.0 of SPSS was used to carry out the analysis.

The database defined by the selected 63 variables mainly consists of variables with different units; the potential problems arising from this are solved with the help of *standardisation*: the expected value of variables was 0 with their expected variance being 1. Identical variance practically means that all the variables have equal weight in the model. However, the logic of the pyramid model implicitly requires that the variables affecting the region's competitiveness in different ways and with different relevance should be included in the model with different weight. Consequently, the three favoured indicators (*GVA per capita, GVA per employee and employment rate*) are included in the system of indicators with a weight of 1. Other indicators related to key indicators are weighted with the linear correlation coefficient value calculated using the given key indicator and the indicator serving its explanation. Global integration as a basic category does not have a favoured indicator; however, it penetrates the entire category of openness and competitiveness, so it exercises an effect equally on all three of the major indicators. Therefore, the indicators of global integration are weighted by the simple arithmetic average of the linear correlational coefficient calculated using the three favoured indicators.

The concept of regional competitiveness and the pyramidal model – as mentioned – can not only model the revealed competitiveness of regions, but also their future development possibilities. Development (programming) factors applicable for economic development have a direct and short-term effect on basic categories, while success determinants influence them indirectly, in the longer run. This means that the development of basic elements and success determinants materializes in the measurable basic categories and through this the ultimate goal of economic development that lies in the improvement of the region's population and their living standard can be achieved. Therefore, the indicators of development (programming) factors and success determinants are weighted by the simple arithmetic average of the linear correlation coefficient of the given variable and the three key indicators of the basic categories.

[1] The replacement of GDP by GVA is also justified by the fact that a strong correlational relationship can be shown between the values of the two indicators calculated for counties (r=0,95).
[2] Territorial GDP and GVA data are usually available with a two-year delay.

Figure 8. Indicators of the analysis



Source: own construction.

Prerequisite of knowledge-based economy is that the division of labour among regions is reorganised. We considered this division of labour according to the types depending on the development level of regions based on the theory of regional competitive development (see chapter 2). Based on the differences existing among knowledge-based regions it is advisable to distinguish where knowledge is created and where it is merely applied. In the case of competitive regional development only in the innovation-driven phase can it be stated that competitive advantages derive from knowledge creation, while in the investment- and factor-

driven phases they only emerge from the utilization of knowledge. Less developed, lagging regions assume an exposed position, certain features of knowledge-based economy are present but neofordist characteristics are prevalent. In harmony with competitive regional development three types of postfordist regions can be distinguished (Lengyel 2003, 2005):

- *Neofordist region*: factor-driven phase (regions with low income),
- *Knowledge transfer region*: investment-driven phase (regions with medium income) and
- *Knowledge creation region*: innovation-driven phase (regions with high income).

4.1. Groups of sub-regions by multidimensional scaling and cluster analysis

Applying the system of weighted indicators, the groups emerging based on the similarity of sub-regions were first examined with the method of *multidimensional scaling* (MDS). MDS does not define groups; however, it provides the geometric representation of objects. Represented in a reduced space according to our expectations, the result is a dot-diagram displaying the relational position of the 168 Hungarian sub-regions and the capital in terms of standard competitiveness. In order to reach easier understanding, first a two-dimensional figure chart was created.

In the case of MDS the reduction of dimensions must be realized in a way that does not alter order in the distance of elements. Consequently, if δ_{ij} represents the real distance of measured variables, while d_{ij} stands for the distance resulting from the reduction of dimensions, then the following must be true in all cases:

$$\text{if } \delta_{ij} < \delta_{lk}, \text{ than } d_{ij} \leq d_{lk} \qquad i=1,2,\ldots,l \qquad j=1,2,\ldots,k \tag{1}$$

It is the *S-stress* value present in SPSS output that shows to what extent the created d_{ij} values meet the criterion above:

$$S-stress = \sqrt{\frac{\sum_{i=1}^{n}\sum_{j=1}^{n}(\delta_{ij}-d_{ij})^2}{\sum_{i=1}^{n}\sum_{j=1}^{n}\delta_{ij}^2}} \tag{2}$$

Obviously, it is favourable if the S-stress value is as little as possible. The value of the indicator is zero if it is true for all element-pairs that following the reduction of dimensions each element kept its ranking according to the original distances. In the case of the 63 indicators of sub-regions, a two-dimensional mapping of the variables results in an S-stress value of 0,0177, which qualifies as *excellent*, so the model with a reduced number of dimensions probably reflects the original relations of sub-regions. This means that the competitiveness of the 168 Hungarian sub-regions can be represented in a two-dimensional space.

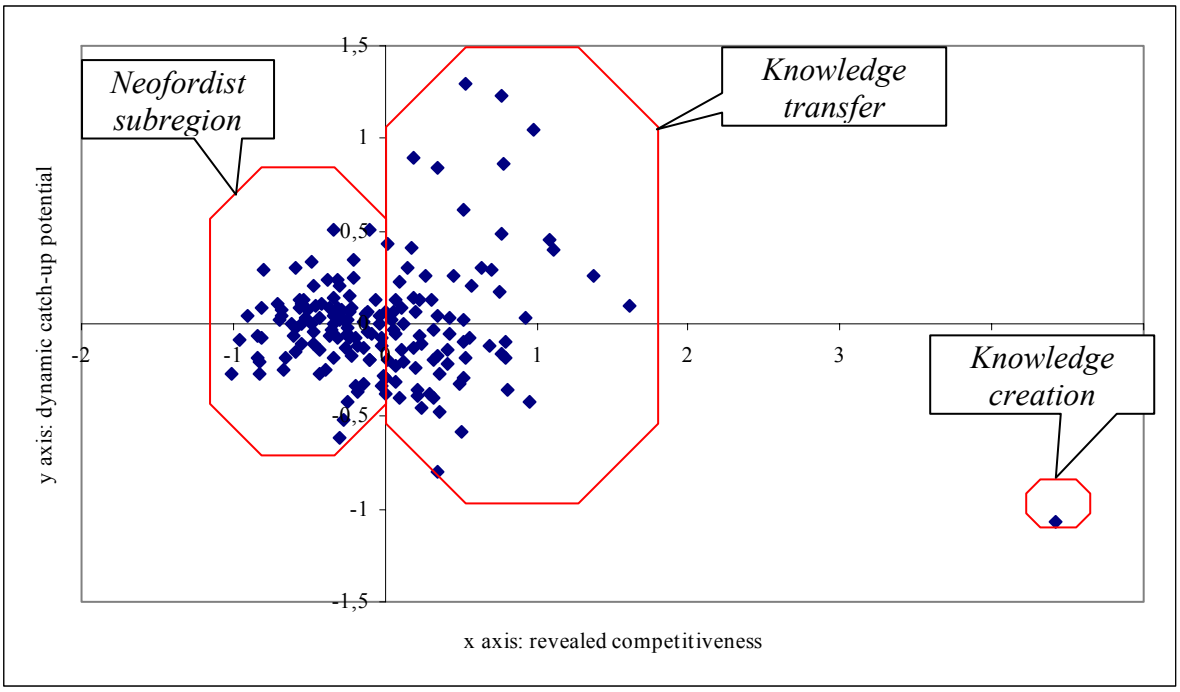
It is often impossible to provide the *interpretation* of the dimensions (that is, the axes of the coordinate system) and add content to them in an exact way. It would be fortunate if one of the dimensions could fully correspond to the concept of *revealed competitiveness*. This hypothesis can be examined by creating a competitiveness ranking from the variables of basic categories representing revealed competitiveness with the help of one-dimensional scaling. If

this ranking corresponds to the position of sub-regions along axis *x*, then our hypothesis is justified.

The value of *Spearman's rank correlation coefficient* between one-dimensional MDS ranking[3] and the coordinates of examination units along axis *x* is 0,989, so practically the two rankings totally correspond to each other. This means that the first dimension of the geometric representation generated as a result of two-dimensional MDS is *static competitiveness* defined by data of 2003. A deeper consideration of the examined data set and conceptual background led us to the conclusion that the second (*y*) dimension should represent *dynamic catch-up potential*. This presumption is justified with the help of the correlation matrix drawn in relation to the coordinates defined by dimensions and explanatory variables: axis *y*, that is, the second dimension has a significant correlational link with those variables that play an important role in catching up.

Compared to one another, regions above axis *x* are capable of fast catch-up, while the ones below axis *x* do not have this potential (*Figure 9*). It is important to emphasize relative situation, since this way Budapest's situation below axis *x* is easily explained: as one of the most competitive examined region, Budapest does not need to catch up with the level represented by it (although it should catch up with the EU). No dynamic catch-up potential lies in the competitiveness most of the subregions, while the few sub-regions are expected to quickly catch up in terms of competitiveness in the near future.

Figure 9. Types of sub-regions by MDS



As mentioned above, the geometric representation established by MDS may include the possibility to identify groups and types (*Figure 9*). In the two-dimensional chart Budapest in itself forms a group positioned quite far from the other two types. Examining the final coordinates of each object shows that knowledge transfer (medium developed) regions are

[3] S-Stress=0,03695, which means *excellent*.

concentrated on the right side of axis *y* in the first and fourth quadrants. In terms of competitiveness these sub-regions lag behind Budapest, but are ahead of relatively underdeveloped (neofordist) regions, furthermore, they also carry catch-up potentials. The third (neofordist) group is situated in the second and third quadrants, as the concentration of the regions ranking lower in terms of competitiveness. Part of these (above axis *x*) carry catch-up potentials, while going down from axis *x* the danger of further lag increases.

Cluster analysis is performed with the same 63 weighted and standardized variables as those used for multidimensional scaling. Based on MDS three groups were created; literature results introduced in chapter 2 usually provide 3 types too, therefore, 3 clusters are expected. From among known clustering methods the non-hierarchical *K-means* method was picked. Going step by step, this method calculates cluster core-points and related objects until cluster centres do not change in one step any more.

According to the classification emerging from the method, Budapest, by itself, consists the most developed cluster, where values based on each variable are especially high (*Table 8*). On the contrary, in the cluster of the 110 relatively underdeveloped sub-regions the majority of indicators show unfavourable values. In the case of the 57 sub-regions classified in the medium developed cluster the values of most indicators fall between the former two extreme values. The homogeneity of each cluster is defined by the distance of cluster members from the final cluster centre. The more classified objects are grouped, concentrated and „clustered" around the cluster centre, the more homogeneous the created cluster may be regarded. Naturally, consisting of only one object, the relatively developed cluster of Budapest is the most homogeneous, while objects falling in the other two clusters have greater diversity.

4.2. Typisation of sub-regions by urban-rural dimensions

The approaches of the typisation of regions reviewed in chapter 2 highlight that in examining the competitiveness of regions special attention must be paid for the *'critical mass'* present in regions, which means the regions' urban or rural nature. Especially strategies aiming to improve competitiveness depend on the size of towns. In line with this challenge the second step of our research attempts to further specify our picture of the regions' competitiveness formed in the first step based on whether the sub-regions classified in the given region type may be considered to be predominantly urban or rural.

It is impossible to determine in an exact way what may be regarded as an obviously limiting criterion drawing a line between urban and rural sub-regions. However, according to all the approaches dealing with this concept urban regions are typically the regions of large towns with significant concentration of the population. Our research also departs from this: based on a traditional approach sub-regions called urban are expected to have a number of population that reaches a critical mass. For this three indicators are used:

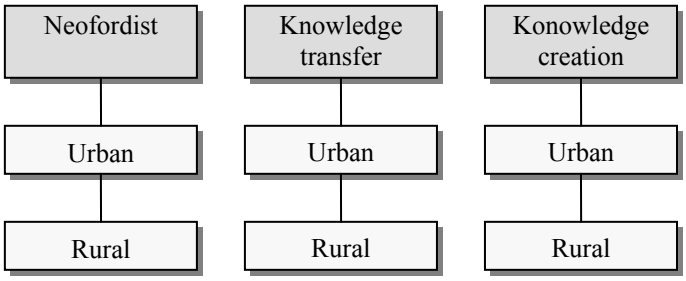
- The number of population in the centre of the sub-region at the end of the examined year: based on recommendations by ESPON (European Spatial Planning Observation Network) and OMB (US Office of Management and Budget) it must reach 50 000 persons.

– The rate of residents living in settlements with a population density of more that 120[4] must be at least 75% in the examined sub-region.

– The rate of the population of the region's centre must not be less than 75% in the sub-region's population.

If at least one of the above described criteria is met, then in relation to Hungarian sub-regions we talk about *urban sub-regions*. However, in a region it is not only population concentration in the classical sense that can represent the critical mass necessary for urban regions, but also knowledge concentrated in the given sub-region. The first and foremost depositories of creating new knowledge are *higher education* institutes the presence of which in a given sub-region may also be regarded as a type of critical mass. Based on this, beyond fulfilling one of the three indicators defined above, according to the implicit criteria of knowledge-based economy sub-regions having higher education institutions also qualify as urban.

Figure 10. Types of sub-regions

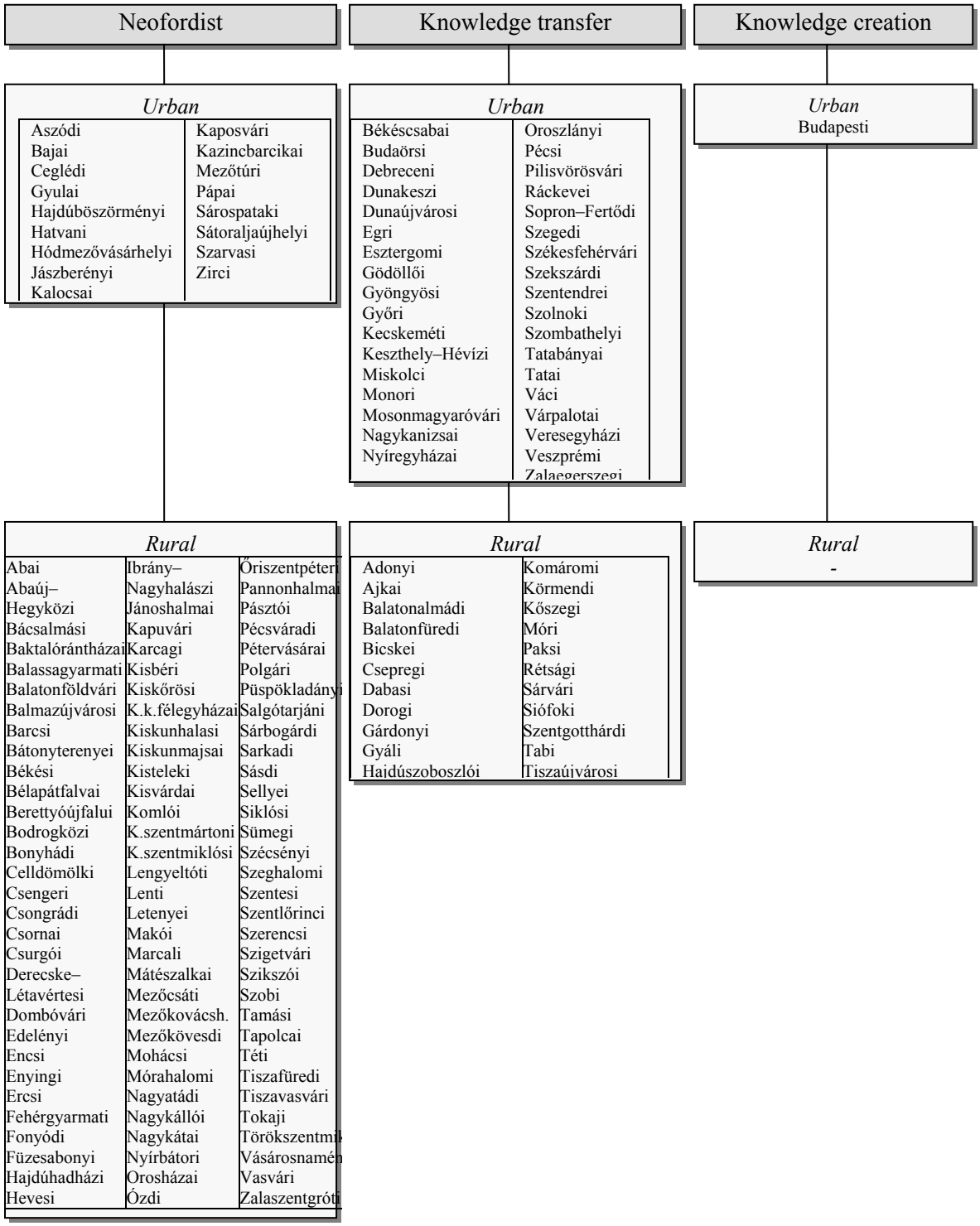


We classified sub-regions based on the three region types above and on urban-rural aspects within each type (*Figure 10*). Out of the 110 sub-regions falling in the neofordist region type according to the above, 17 sub-regions (15,4%) may be regarded as urban, out of the 57 sub-regions classified in the category of knowledge transfer this number is 35 (61%), while the only sub-region (Budapest) in the knowledge creation region type is urban (*Figure 11*). Consequently, in more developed region types the proportionate share of urban regions is higher; while that of rural regions filling the less developed space among them is lower. It is also noticeable that the more developed region type a sub-region is classified in, the more it fulfils out of the four above mentioned criteria necessary for the classification as urban. The urban sub-regions of the neofordist region type may be regarded as urban according to an average of 1.04 criteria, the same value is 2.03 in the case of small urban regions of the knowledge transfer region type, while the knowledge creating sub-region of Budapest qualifies as urban based on all four of the urbanisation criteria. It is also important that knowledge transfer urban sub-regions also include five sub-regions that meet all four of the urbanisation criteria.

So far Hungary's 168 sub-regions have been classified along two dimensions: first they were divided in three development phases according to 63 indicators describing *competitiveness*, then with the help of examining the *urbanisation level* of sub-regions the results of the first classification were further specified according to population concentration. The classification of sub-regions along these two dimensions can be represented in a rectangular coordinate system (*Figure 12*).

[4] OECD's recommendation includes 150 persons/sq. km, while the Eurostat and Hungarian Statistical Office defines the limit value in 120.

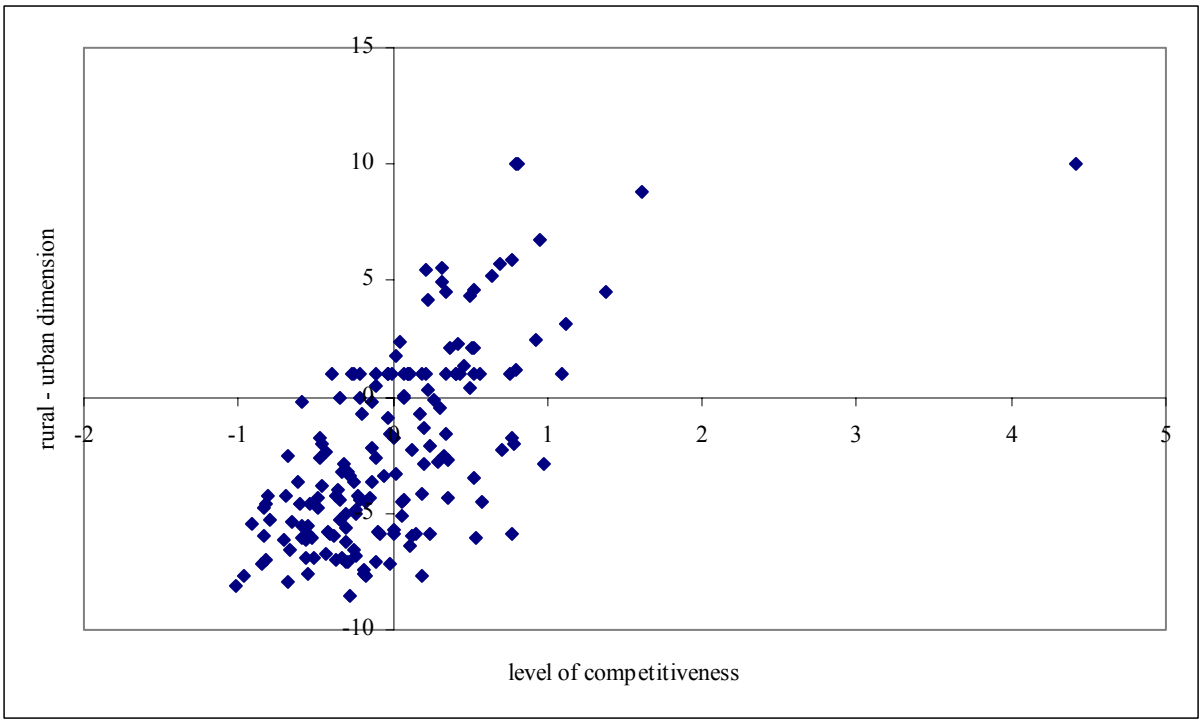
Figure 11. Typisation of Hungarian sub-regions



The situation of sub-regions along axis *x* fully corresponds to the output of one-dimensional scaling performed based on the 63 indicators, which means that this axis represents the complex competitiveness of sub-regions. Axis *y* differentiates along the urban-rural dimension. The *y* coordinates of each sub-region were reached by transforming the value of the above defined three 'classic' indicators measurable on a gold scale to a scale of minus 10 and plus 10. In case of all three indicators zero represented the threshold value necessary for the classification of urban, the minimum criterion value of the data line was equivalent to

minus 10 points while its maximum criterion value was equivalent to plus 10 points. Sub-regions having a value higher than the threshold value received positive points, while the ones not reaching the threshold value received negative points. The fourth criterion measurable on a nominal scale (whether there is a higher education institution in the sub-region) was included in the database with plus 1 point in case of a positive answer, and minus 1 point in case of a negative answer. Finally, the *y* coordinates of sub-regions were produced by the maximum of the transformed value of the four criteria in case of urban regions; while in case of small rural regions it was produced by the maximum value of the three indicators measurable on a gold scale[5].

Figure 12. Hungarian sub-regions by competitiveness and urbanisation dimensions



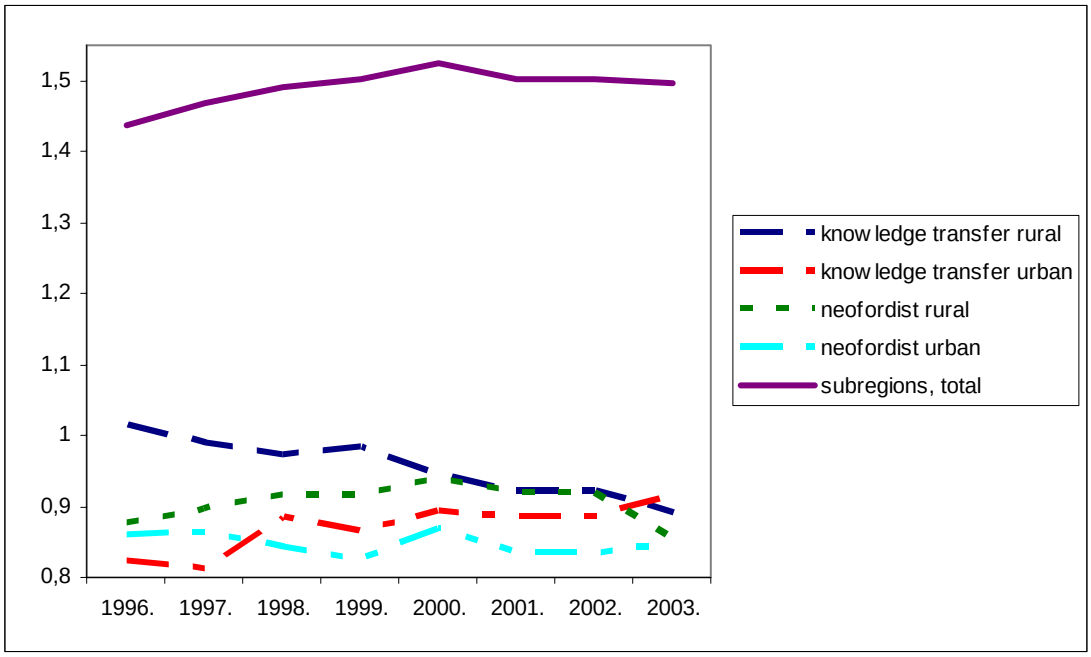
The analysis of variance described in chapter 2 (the development in time of the standard deviation in GVA per capita), which was performed separately for each region type created after the classification offers a chance to decide whether the classification of sub-regions based on the above described two dimensions really established relatively homogeneous groups. The analysis of standard deviation (by natural logarithm) was carried our for four region types:

- knowledge transfer, urban,
- knowledge transfer, rural,
- neofordist, urban,
- neofordist, rural.

[5] In case of rural sub-regions for the definition of the *y* coordinate the variable coded to have a value of minus 1 was not taken into account, since this indicator was only meant to highlight urban sub-regions and is not suitable for the differentiation of rural sub-regions.

For the urban knowledge transfer region type – since it consists of only one object, Budapest – the analysis was not carried out. In all of the other four cases it can be stated that on one hand, in all the four cases the gross value added (GVA) is less varied around the average value *in each year* than in the case calculated for every sub-region, on the other hand, GVA varies less from year to year around the average value than in the case of the calculation jointly performed for all of the sub-regions[6] (*Figure 13*).

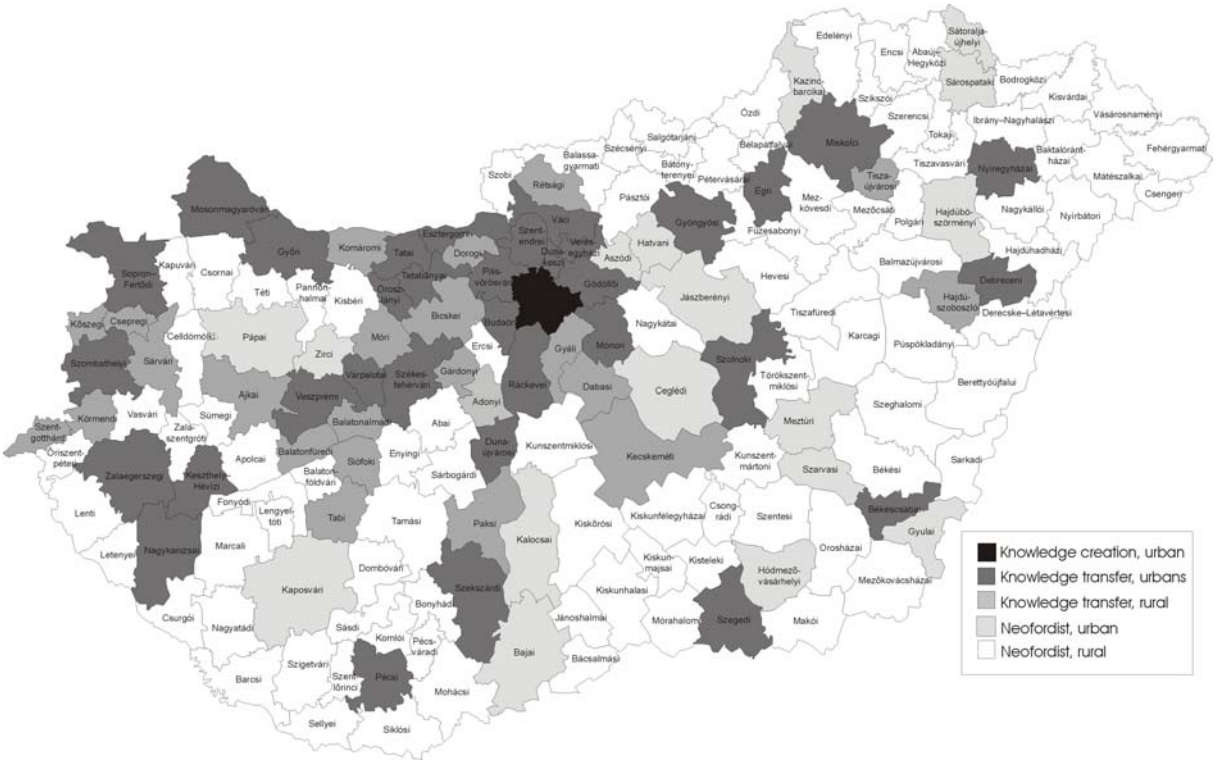
Figure 13. Standard deviation by region-types of sub-regions



As for the spatial concentration of relative development (competitiveness core) and urbanisation level, it can be stated that the only relatively developed and urbanised sub-region of the capital is circularly embraced by knowledge transfer sub-regions, 90% of which are urban. Furthermore, urban knowledge transfer sub-regions are also the sub-regions of county towns themselves (with two exceptions) or the sub-regions of large towns. Knowledge transfer sub-regions (urban as well as rural ones) are concentrated in the vicinity of developed Western centres and motorways. Furthermore, it can be said that knowledge transfer sub-regions are predominantly concentrated in the North-Western and Central part of the country, while neofordist sub-regions are situated in the Northern and Eastern border zone (*Figure 14*).

[6]The value of parameter $\hat{\beta}_1$ indicating the slope of the linear regression line adapted to the data line is 0,0083, in case of examining all the sub-regions together; it is -0,0168, in case of a separate analysis ofrural knowledge transfer sub-regions, 0,0012 is case of a separate analysis of urban knowledge transfer sub-regions, 0,000008 in case of a separate analysis of rural neofordist sub regions and -0,0024 in case of urban neofordist sub-regions.

Figure 14. Hungarian sub-regions by competitiveness types



Summary

Based on its GDP per capita calculated in PPS Hungary is getting closer to the European Union's average. Taking into account the entire country, a process of catching up has begun, however, this is accompanied by the growth of regional differences: the relative development of developed regions further increased, while in the case of relatively underdeveloped sub-regions a further lag can be recognized. Development or underdevelopment is not equally distributed in country, even within underdeveloped sub-regions some nodal regions that can be described with a higher level of competitiveness can be detected and this is also true the other way round.

The present paper performed the classification of Hungarian sub-regions based on pyramidal model of the standard regional competitivenes. The use of various methods with different logics lead to similar results, therefore, it is likely that we managed to map the competitiveness of sub-regions realistically. Based on this, we believe that the pyramidal model and the methodology based on it are suitable to make regional competitiveness measurable and outline the possibilities of economic development. The results introduced in the present paper constitute the first step of our research, in the following we would like to test the choice of the system of indicators and the statistical methodology, with special emphasis on checking the weight of indicators. Furthermore, we would like to define types of competitiveness that may also serve as the basis of realistic economic development strategies.

From the aspect of economic development what opportunities a sub-region has to participate in global competition is particularly important. Developed and underdeveloped sub-regions' chances of joining the international division of labour are different. The

difference in the emerging conditions requires the use of different bottom-up economic development interventions and strategies, especially between 2007-13. Therefore, economic development must not be realized in a homogeneous way, the characteristics and departure point of the examined sub-region must be considered. Regions describable by differences in competitiveness must take different paths in order to achieve economic development and consequently, successful long-term presence in global competition.

Owing to their significantly different departure points, the sub-regions 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 *knowledge creation urban sub-region* the critical mass of qualified workforce with convertible knowledge, knowledge intensive enterprises and background institutions necessary for realizing successful economic development are present. Therefore, at the Budapest there is real chance for the successful organisation of innovation clusters.

In *knowledge transfer urban sub-regions* 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 sub-regions* 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.

In *neofordist urban sub-regions* the launch of economic restructurization is recommended. The main goal lies in developing technical infrastructure and attracting the sites of global companies with the help of prepared industrial areas, low taxes, cheap work force, and financial support (recruiting industry branches). Satellite industry branch areas are most likely to be formed, if this is realized, focus must be placed on helping local embedment.

In *neofordist rural sub-regions* rural development and agrarian economy of high quality constitute a possible direction of development promising realistic results. It is important, however, that in case of this region type besides improving competitiveness, fair treatment and solidarity also assume a significant role, since without assisting rural development this region type cannot develop.

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