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Environmental conditions of gully erosion in Hungary

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Abstract

Soil erosion research has become very important over the last decades. It is the subject matter of several disciplines, geographers, geomorphologists, soil scientists, hydrologists, agronomists and other scientists publish on this topic and the authors of these publications are members of interdisciplinary and in most cases also international teams. Research on soil erosion by water concentrated, however, mainly on sheet erosion. The role of gully erosion has been recognized only lately. The presence and dynamics of various gully types (permanent, ephemeral and bank gullies) can be observed and their development can be followed under different climatic conditions and various land use types and sheet and rill erosion measurements on runoff plots are not realistic indicators of total catchment erosion (POESEN, J. *et al.* 2003). Another weakness of plot measurements of sheet erosion is that they do not give information about the redistribution of eroded soil within a field (POESEN, J. *et al.* 2003). Gully erosion plays a decisive role in the redistribution of eroded soil on a slope and in delivering it to watercourses (EVANS, R. 1993, cited by POESEN, J. *et al.* 2003). All these statements point to the need of intensive research on gully erosion.

Keywords: gully and rill erosion, soil loss, land use change

Introduction

The process of gully erosion generates 20–30 cm to 20 m deep gullies (BERGSMA, E. 1996). Although there are contradictory views about the share of gully erosion in the total amount of soil loss our experiences show that gully erosion processes have a bigger share than those of sheet erosion (JAKAB, G. *et al.* 2006).

According to the Hungarian classification gully erosion is one of the processes of linear erosion (see e.g. JAKAB, G. 2008). Linear erosion is a logical scientific name for this group of processes but it is not used worldwide. Micro-rill, rill and gully erosion belong to the group of linear erosion processes. For the really big gullies, i.e. for those with significant volume and especially deepness the expression of gorge (ravine) erosion is also used. Linearity is included in every definition. E.g. POESEN, J. *et al.* (2003) define gully erosion “as the erosion process whereby runoff water accumulates and often recurs in

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narrow channels and, over short periods, removes the soil from this narrow area to considerable depths”.

The definitions of various forms of linear erosion (rill and gully erosion) are given by JAKAB, G. (2006) in Hungarian language. In this classification the value of 50 cm (width and depth) separates rills from gullies and deep-cut tracks are defined as a special group of gullies. They were dealt with in detail by KERTÉSZ, Á. (1984). KERÉNYI, A. (1991) applied also the 50 cm value to differentiate between rills and gullies. Various Hungarian and foreign authors use different threshold values and definitions. A detailed analysis and comparison of them will not be given here as it would not bring essential information on the topic.

An important step in gully erosion research was the introduction of the term ephemeral gully erosion (FOSTER, G.R. 1986). The size of ephemeral gullies is between rills (*Photo 1*) and gullies (*Photo 2*), i.e. these gullies can still be removed by cultivation, while permanent gullies are too deep to ameliorate with tillage machines (Soil Science Society of America 2001). Bank gullies are defined as gullies developed on earth banks, i.e. where concentrated runoff crosses a bank (POESEN, J. *et al.* 2003).

A very clear classification and description of erosion processes is given by LAFLÉN, J.M. (1985, see *Table 1*).



Photo 1. Rills on arable land

Table 1. *Classification and description of erosion processes by LAFLÉN, J.M. (1985)*

Sheet and rill erosion	Ephemeral gully erosion	Gully erosion
Occurs on smooth side slopes above drainageline.	Occurs along shallow drainagelines upstream from incised channels or gullies.	Generally occur in well defined drainage-lines.
May be of any size but are usually smaller than concentrated flow channels.	May be of any size but are usually larger than rills and smaller than permanent gullies.	Usually larger than concentrated flow channels and rills.
Flow pattern develops many small disconnected parallel channels which end at concentrated flow channels, terrace channels or in depositional areas.	Usually forms a dendritic pattern along water courses beginning where overland flow, including rills, converge. Flow patterns influenced by tillage, rows, terraces, man made features.	Dendritic pattern along natural water courses. May occur in non-dendritic patterns in road ditches, terrace or diversion channels, etc.
Rill cross-sections usually are narrow relative to depth.	Cross-sections usually are wide relative to depth. Sidewalls not well defined. Headcuts not readily; do not become prominent because of tillage.	Cross-sections usually narrow relative to depth. Sidewalls are steep. Headcut prominent. Eroding channel advances upstream.
Rills normally removed by tillage, usually do not reoccur in the same place.	Temporary feature, usually removed by tillage; reoccur in same place.	Not removed by tillage.
Soil removed in thin layers or shallow channels. Soil profile becomes thinner over entire slope.	Soil removed along narrow flow path, to tillage depth if untilled layer is resistant to erosion, or deeper if untilled layer is less resistant.	Soil may erode to depth of profile, and can erode into soft bedrock.
Low erosion rates not readily visible.	Area may or may not be visibly eroding.	Erosion readily visible
Detachment and transport by raindrops and flowing water.	Detachment and transport by flowing water only.	Detachment by flowing water, slumping of unstable banks and headcut retreat; transport by flowing water.



Photo 2. Gully in a forested area just below an arable field

In order to understand gully initiation and development usually the following questions are asked: (1) What is the importance of surface and near surface lithology? (2) What are the topographic threshold values leading to the formation of gullies? (3) What are the characteristics climatic conditions (first of all rainfall amounts and intensities) to trigger gully development? (4) What is the role of land use and land use change? (5) What socio-economic factors influence gully initiation and extension in a given area? The present paper tries to answer these questions by examining the conditions of gully formation and development in Hungary.

Soil erosion in Hungary

Land degradation processes play an important role in relief formation and development in Hungary. Soil erosion is one of the most significant land degradation processes on agricultural areas. Other land degradation processes, such as: mass movements, extreme soil reaction (including acidification and salinization/alkalization), physical degradation and other chemical, physical and biological degradation processes (see VÁRALLYAY, GY.–LESZTÁK, M. 1990; KERTÉSZ, A. 2001) are also important, but they are not as extended as soil erosion. Soil is one of the most important natural resources in Hungary, therefore soil erosion studies and soil erosion control are very important issues.

25% of the total area of Hungary (more than one-third of agricultural land) is affected by water erosion (on agricultural land 13.2% slightly, 13.6% moderately and 8.5% severely eroded) and 16% is affected by wind erosion (STEFANOVITS, P.–VÁRALLYAY, GY. 1992, see *Table 2*).

Table 2. Soil erosion in Hungary

Indicator	Thousand hectares	% of the total area	% of the agricultural land	% of the eroded land
Area of the country	9,303	100.0	–	–
Agricultural land	6,484	69.7	100.0	–
Arable land	4,713	50.7	73.0	–
Total eroded land	2,297	24.7	35.3	100.0
<i>strongly</i>	554	6.0	8.5	24.1
<i>moderately</i>	885	9.5	13.6	38.5
<i>weakly</i>	852	9.2	13.2	37.4

The significance of soil erosion processes was recognized half a century ago and a soil erosion map was constructed by STEFANOVITS, P. and DUCK, T. (1964) covering, however, only improved farmland (excluding non agricultural uses, e.g. forests, urban and industrial areas, roads, etc.). The mapping was based upon the analysis of soil profiles. As a consequence of the applied method only areas effected by sheet erosion are identified on the map and the areas of gully erosion were not shown on it. Soil erosion research concentrated mainly on sheet erosion and the assessments were restricted to smaller areas, hillslopes or small catchments.

a) Water erosion. Sheet erosion is an important problem on most of arable land. Before the change of the regime in 1989 large arable fields were created allowing for an even more extensive damage of sheet erosion. Most of the crop is harvested by the beginning of July leaving large surfaces without vegetation during the most sensitive period, i.e. between July and October. Sheet erosion processes are supported by micro-solifluction and by splash erosion (KERÉNYI, A. 1991). Gully erosion will be dealt with below in detail.

b) *Wind erosion* is highly extensive on the areas of wind blown sand, which occupy about 20% of the country's territory. The thickness of the sand varies from a few centimeters to 25–30 meters. Damage is primarily caused on sandy soils, where crop yields may be reduced by up to 50%. Improperly cultivated peat soils with decomposed, powdery surfaces also have low resistance to wind erosion.

Gully erosion research in Hungary

As mentioned before, the role of gully erosion processes was not properly recognized until lately and it was believed that it is mainly sheet erosion which causes damage on agricultural land.

This statement is also true in the case of Hungarian research. Gully classification systems will be treated first followed by a short review of scientific publications on gullying.

A gully erosion survey was carried out to characterize gully erosion according to the length of gullies in a given area (STEFANOVITS, P.–VÁRALLYAY, Gy. 1992). Based on this survey the following categories were suggested.

- a) weakly gullied area: $<200 \text{ m/km}^2$ gullies;
- b) moderately gullied area: $200\text{--}500 \text{ m/km}^2$;
- c) strongly gullied area: $>500 \text{ m/km}^2$.

A classification system based on soil loss values was suggested by THYLL, Sz. (1992). According to the method soil loss values will be identified on a $40 \times 40 \text{ m}$ test area to give the rate of gully erosion. The categories are weak ($<40 \text{ t/ha}$), medium ($40\text{--}100 \text{ t/ha}$) and strong ($>100 \text{ t/ha}$) gully erosion. The selection of the very small test area influences the obtained result very much and therefore this method cannot bring reliable results.

Observations and descriptions of gully erosion date back to the last century (see. e.g. PÉCSI M. 1955). The gullies of the Tokaj Hill were investigated by PINCZÉS Z. (1968, 1980). He used the number and extent of rills to identify the degree of soil erosion. BOROS L. (1977) elaborated a simple method for mapping rills and gullies providing also some information on their morphometrical properties.

Hilly areas with thick loess cover or with loose Pannonian sediments have unique geomorphological features and they are prone to rill and gully development (see. e.g. KÁDÁR L. 1954; ÁDÁM, L. 1969). Among them the Tolna and Szekszárd hilly countries were studied in detail by ÁDÁM, L. (1969). KERÉNYI, A. and KOCSISNÉ HODOSI, E. (1990) reported on the development of erosional forms in vineyards covered by loess. The role of piping was recognized by several authors (KÁDÁR L. 1954; ÁDÁM, L. 1969; KERÉNYI, A.–KOCSISNÉ HODOSI, E. 1990).

Investigations in Lake Balaton catchment by various authors included also some aspects of gully development. The Department of Physical Geography of the Hungarian Academy of Sciences carried out several research projects on soil erosion forms and processes in the catchment. TÓTH A. (2004) analysed the ratio of sheet and gully erosion in the Tetves catchment. JAKAB, G. *et al.* (2005) made a very detailed morphometrical survey of gullies in the same catchment. KERTÉSZ, Á. (2004a) studied geomorphic processes on collapsible and dispersive soils. Rill initiation and development was part of various rainfall simulation experiments (CSEPINSZKY B. *et al.* 1998; CSEPINSZKY B.–JAKAB G. 1999; SISÁK, I. *et al.* 2002; CENTERI, Cs. 2002; CENTERI, Cs.–PATAKI, R. 2003, 2005; 2005, SZŰCS, P. *et al.* 2006; JAKAB, G.–SZALAI, Z. 2005; BALOGH J. *et al.* 2008).

There is also historical evidence (see e.g. GÁBRIS, Gy. *et al.* 2003) that a very intensive gully erosion activity took place in the nineteenth century when large areas covered by loose sediments were deforested and opened for arable farming.

Conditions of gully development

a) Slope gradient

STEFANOVITS, P.–VÁRALLYAY, Gy. (1992) investigated the effect of *relief* on water erosion (including both sheet and gully erosion) in Hungary according to slope gradient categories. On slopes <5% erosion hazard is negligible. As slopes >25% are generally forested they do not imply a high erosion risk. The 17–25% slopes are either under forest or were deforested in the recent past. Most of the 5–17% slopes are used for agriculture and deteriorated by soil erosion to a certain extent (KRISZTIÁN J. 1992). There are no studies carried out on the threshold value of slope gradient for gully initiation. It would be interesting to investigate the relationship between critical slope gradient versus upslope drainage area for (ephemeral) gully initiation (see VANDAELE, K. *et al.* 1996).

b) Soil parent material

About two thirds of the total area of Hungary are covered by loose sediments, mainly by loess and loess like deposits, susceptible to soil erosion and mass movement processes in the hilly regions of the country. Soil erosion is the greatest environmental hazard on hillslopes under cultivation. The thickness of slope loess varies between 5 and 25 m. Recent processes acting on loose sediments were mainly dealt with as part of geomorphological mapping activities and geomor-

phological surveys (KERTÉSZ, Á. 2004b). The best conditions for gully erosion are provided in the areas of thick loess cover (e.g. Szekszárd hilly country). Other loose sediments like Pannonian sands are also susceptible to gully erosion.

c) Soil properties

Soils of the loess covered areas are generally highly erodible because the parent material of the soil is a loose sediment. The initiation and development of gullies is in some cases promoted by subsurface erosion, i.e. by piping (called also suffosion in Hungarian literature, see JAKAB, G. *et al.* 2005).

Physical and chemical properties of loess and loess-like sediments offer favourable conditions for the development of pipes. Collapsibility is primarily connected with calcium carbonate content (including lime concretions in older loess deposits), with the very high porosity (volume of pores is 40–60%). The most important processes on collapsible/dispersive rocks and soils include sheet erosion, rill erosion, gully erosion, piping (tunnel erosion, suberosion), wind erosion and mass movements.

d) Climatic conditions

Gully erosion is more frequent under arid conditions and less frequent under humid climatic conditions (POESEN J. *et al.* 1996). Recent research concentrates on the occurrence of erosive rainfall events. In most cases the role of rainfall characteristics in SL Gully % (the percentage of soil loss caused by gully erosion in the total soil loss of the catchment. Evidently the amplitude and frequency of rainfall events are the most important rainfall characteristics. It is also evident that any change in rainfall regime (e.g. because of climate change) will lead to the change of the value of SL Gully %.

For the development of sheet and gully erosion, „erosion-sensitive days” characterized by >30 mm daily rainfall are of crucial importance. (STEFANOVITS, P.–VÁRALLYAY, GY. 1992), which may occur 4–12-times per year in Hungary.

Concerning rainfall characteristics the most informative value is the rainfall threshold leading to the development of gullies in various environments. According to POESEN J. *et al.* (2003) there is not much difference in threshold rains of rills and gullies. There are no data available on threshold rains in Hungary.

Global climate change is very likely to increase gully erosion risk. Extreme events are going to be more frequent. In summer long periods of draught will alternate with storms (high intensity rainfalls). In winter freezing, melting and intensive rainfalls will alternate.

e) Land use change

Land use plays a key role in the development of land degradation processes. Recent studies indicate that (1) gully erosion represents an important sediment source in a range of environments and (2) gullies are effective links for transferring runoff and sediment from uplands to valley bottoms and permanent channels where they aggravate off site effects of water erosion. In other words, once gullies develop, they increase the connectivity in the landscape. Many cases of damage (sediment and chemical) to watercourses and properties by runoff from agricultural land relate to (ephemeral) gullying. There is a huge number of studies on the effect of land use on gully development. GÁBRIS, Gy. *et al.* (2003) reported on a very intensive gully erosion activity in the nineteenth century when large areas deforested. Deforestation and starting agricultural activity on former forested areas increases gully erosion risk also in Hungary.

Conclusions

The hilly countries of Hungary are mainly covered by unconsolidated sediments, with a prevalence of loess and loess like sediments among them. Loess covered areas are prone to erosion and mass movements. The paper provided an analysis of the physico-geographical conditions of gully development in Hungary. Gully erosion risk is present on various landscapes because of the environmental conditions.

a) Great Hungarian Plain. Even lowlands covered by a thick layer of loess and other loose sediments are prone to gullying. Along the banks of rivers (e.g. some sections of the Danube valley) various forms of erosion including gullies are present. Rills and gullies will be formed on sand accumulation areas. These forms are very dynamic, change rapidly and disappear on moving sand (see BOROS L.–BOROS L.-né. 1980) and on sandy soils.

b) Hilly countries and mountains. Being covered by loess and other loose sediments hilly countries all are prone to gully erosion. Big elevation differences in a small area, i.e. high relative relief values point to a high risk of gullying (e.g. Somogy, Tolna, Szekszárd hilly countries). Deforested areas used by agriculture, especially arable lands and vineyards have an enhanced risk.

Mountains are mostly forested with spots of clearings. Even in the mountain forest there is a risk of gullying. Antropogenous activities (e.g. timber transport tracks, unpaved forest roads etc.) contribute to the risk of gully erosion.

Medium and long term land use planning should ensure a minimum risk of gully erosion with special emphasis on afforestation.

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Degree of human transformation of landscapes: a case study from Hungary

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Abstract

CORINE land use categories were used to identify the scale of human impact on the landscapes. The test area covered 12 natural microregions in north-eastern Hungary (Figure 1). It was found that of the 12 microregions the oligohemerobe areas dominated in three, β -euhemerobe in eight whereas α -euhemerobe areas prevailed in one of them. The standard deviation value of the oligohemeroby data is the highest. There is not a single microregion in the study area with unfavourable landscape structure for ecotops from the aspect of human impacts. It is reasonable to weigh the different hemeroby levels. The dataset in Table 3 is the numerical representation of the degree of anthropogenic impacts when spatial ratios are taken into account. Adding up the weighed hemeroby values the degree of anthropogenic load on the landscape can be calculated. The resulting parameter can be called the hemeroby index (Table 5).

Keywords: hemeroby, CORINE

Introduction

The scale of human impacts on landscapes is very important in ecological landscape evaluation. To characterise various forms of anthropogenic landscape modification effects (from noise to soil pollution) is a difficult task.

In a chapter of a volume of studies published by the European Environmental Agency in 2005, indicators of the undisturbed natural environment are introduced (The European... 2005). These indicators seem to be odd at first sight. According to this concept those segments on the Earth surface should be considered free of human impact, where:

- population density is less than 1 inhabitant/km²,
- there are not any roads or waterways used for transportation within 15 km,
- there are neither settlements nor railway lines within 2 km,
- lands are not and have never been used for agricultural purposes, finally,

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– there is not any light emission visible from a spacecraft in the night.

According to these criteria 83% of the mainland is affected by human impact in a global dimension. On the basis of these criteria there are barely any undisturbed areas in Europe, and in Hungary no intact areas exist at all. These criteria are probably too strict, but if we are looking for real ecological refuges, in areas meeting the criteria mentioned above there are not significant anthropogenic effects with a good chance. In this study a method based on the land use categories of the CORINE Land Cover 50 database is presented. It can be an adequate tool to identify the degree of man-induced transformation of landscapes (CSORBA, P.–SZABÓ, SZ.–CSORBA, K. 2006).

Levels of hemeroby and the CORINE categories

There are different levels of anthropogenic impacts though. *Less strict* parameters are required for a *better differentiation* between areas with weak or medium level of human impacts in the Carpathian Basin.

CORINE land use categories were used for the development of the method. The Finnish researcher J. JALAS introduced categories of hemeroby (synanthropy) in 1955. The original categories were as follows: oligohemerobe, mezohemerobe, euhemerobe, polyhemerobe and metahemerobe. German scientists added the α - and β -euhemeroby categories, this way the classification in its present form contains 7 categories (BASTIAN, O.–SCHREIBER, K-F. 1994; BORNKAMM, R. 1980; GRABHERR, G. *et al.* 1998).

For the evaluation of anthropogenic impacts on microregional level the following classification were used (*Table 1*).

Table 1. Classification of satellite image evaluation categories of CORINE into hemeroby levels

Hemeroby levels	CORINE categories
ahemerobe level	absent in Hungary
oligohemerobe level	3.1.1: deciduous forests
	3.2.1: natural grasslands, close-to-natural meadows
	3.2.2: low shrubs, shrub areas
	3.2.4: transitional shrub-forest areas
	3.3.2: bare rock
	3.3.3: sparse vegetation
	4.1.1: continental marshes
	4.1.2: peat bogs
	5.1.1: rivers, waterways
mesohemerobe level	5.1.2: lakes
	2.3.1: meadows/pastures
	3.1.2: coniferous forests
	3.1.3: mixed forests

Table 1. (Continuation)

Hemeroby levels	CORINE categories
β -euhemerobe level	2.1.1: non-irrigated ploughlands 2.4.1: mixed annual and permanent cultures 2.4.2: complex cultivation structure 2.4.3: agricultural areas with significant natural vegetation
α -euhemerobe level	2.2.1: vineyards 2.2.2: orchards
polyhemerobe level	1.3.2: waste dumps 1.4.1: urban green spots
metahemerobe level	1.1.1: continuous settlement structure 1.1.2: discontinuous settlement structure 1.2.2: road and railway network with the related areas 1.2.4: airports 1.3.1: areas of raw material extraction 1.3.3: building sites 1.4.2: sport- and recreation areas

Application of hemeroby levels of the CORINE categories in a study area (north-eastern Hungary)

The map showing human impact for the 12 microregions or microregion groups of north-eastern Hungary was prepared on the basis of the classification shown in Figure 1 (CSORBA P. 1996, CSORBA P. 1996/a). Percentage values of hemeroby levels within the area of the microregions are presented in Table 2.

Of the 12 microregions in three the oligohemerobe, in eight the β -euhemerobe and in one the α -euhemerobe category is dominant by percentage. The most uniform microregions are Harangod, Szerencsköz and Central Zemplén. The first two are characterized by β -euhemerobe arable lands (87% and 86 % of their area). The latter has close-to-natural (oligohemerobe) vegetation only slightly affected by human impacts. The strong human interference in the world-famous Tokaj wine growing area is marked by the fact that the highest ratio of α -euhemerobe areas among the 12 microregions can be found here. The ratio of densely built up metahemerobe areas is around 5% on an average, with the lowest values found in Central Zemplén and and the highest ones in the Hernád Valley.

In the 12 microregions or microregion groups the β -euhemerobe and oligohemerobe categories are dominant. It means that they are composed by areas of semi-natural and close-to-natural levels of anthropogenic impact even though these categories have the highest standard deviation value. The lowest standard deviation value belongs to Harangod microregion (4.6%), and the highest one is found in Central Zemplén microregion (85.5%). Polyhemerobe areas like waste dumps and urban green areas play a negligible role in the study area.

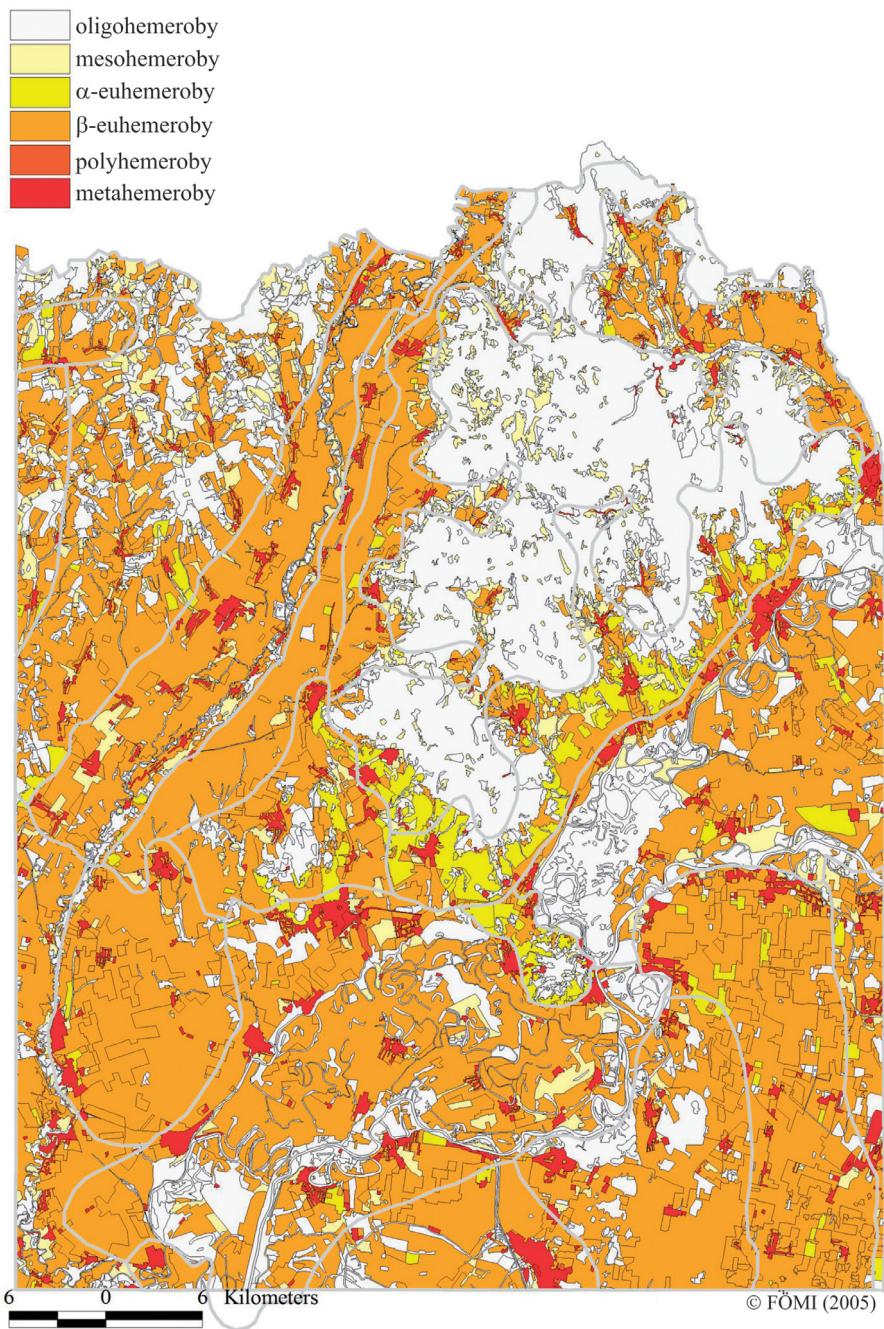


Figure 1. Hemeroby map of the study area

Table 2. Percentage values of hemeroby levels within the 12 microregions or microregion groups in north-eastern Hungary (highest values for the individual microregions are shown in bold)

Microregions	oligo-hemerobe	mezo-hemerobe	β -euhe-merobe	α -euhe-merobe	poly-hemerobe	meta-hemerobe
Eastern Cserehát	36.9	11.9	47.6	2.1	0.0	1.5
Hernád Valley	13.3	8.0	72.0	0.6	0.0	6.1
Szerencsköz	6.3	4.1	86.0	0.7	0.1	2.8
Taktaköz	28.5	5.3	59.1	0.9	0.3	5.9
Harangod	4.6	2.0	87.1	1.0	0.0	5.3
Szerencs Hills	19.1	6.5	59.6	9.9	0.1	4.8
Tokaji Hill	34.4	1.7	15.4	42.8	0.4	5.3
Tokaj Foothill	40.9	8.7	23.0	23.9	0.0	3.5
Abaúj Foothills	28.4	12.5	53.7	1.7	0.0	3.7
Central Zemplén	85.5	8.1	3.4	2.0	0.0	1.0
Hegyköz Hills	30.0	13.0	50.7	1.2	0.3	4.8
Vitány Horsts	77.1	11.0	10.9	0.0	0.0	1.0
Average	33.7	7.7	47.5	7.2	0.1	3.8

Further data analyses

Cumulative curves plotted from the data in Table 2 clearly demonstrate the scale of human impacts within the microregions of the sample area. Characteristic curves are presented in Figure 2.

Smoother curves indicate an even distribution of the spatial extent of different hemeroby categories within the microregions. Steep curve sections refer to hemeroby levels dominant in the given microregion. Figure 2 shows that the curves of Eastern Cserehát and Tokaj Foothill microregions are the most even indicating that hemeroby categories have much more uniform spatial distribution in these microregions than in the Central Zemplén or Vitány Horsts microregions.

In a landscape ecological sense this *uniformity in the distribution of hemeroby categories* refers to a very high spatial diversity of microregions. There is not any category occupying more than 50% within the area of such microregions.

Close-to-natural ecological features dominate those microregions where oligo- and mesohemerobe categories prevail, thus pointing to minor human intervention. Most microregions in the study area are characterised by semi-natural ecotops (euhemerobe levels). As far as the scale of anthropogenic impacts is concerned there are not any microregions in the study area with unfavourable landscape structure for ecotops,.

Hemeroby ratio categories provide a reliable fundament for qualitative evaluation of landscape structures so that landscape ecological evaluation can be rendered more accurate.

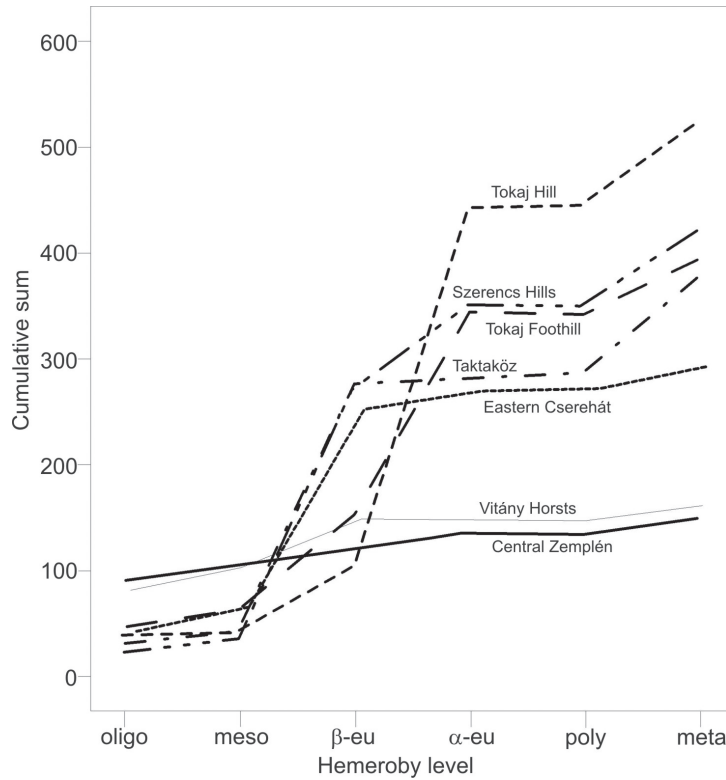


Figure 2. Cumulative curves of the hemeroby categories of selected micro regions in the study area

Issues of data weighing

It is desirable to *add weights to hemeroby categories* because increasing anthropogenic impacts on landscape structure lead to more serious disturbances. A mesohemerobe landscape section with a spatial ratio of 10% has quite a different effect on landscape functions than a polyhemerobe or a metahemerobe section has with the same spatial extension. The impact also depends on the spatial pattern of patches with significant anthropogenic effects upon the landscape. For instance if a metahemerobe patch *hinders the functioning of the most important landscape ecological corridors it will have a much stronger effect on landscape functions than in the case when it blocks the connections of a peripheral landscape unit*. For example a waste dump can play different roles depending upon what importance does the blocked landscape structure element have in relation to the landscape functions.

It would be reasonable therefore to weigh the different hemeroby levels just as a differentiation is necessary in the case of the evaluation of ecotop fragmentation effects of motorways and minor roads. Using a simple weighing based on the scale of anthropogenic impacts the role of euhemerobe, polyhemerobe and metahemerobe categories will be more emphasized. For the accurate description of ecological role however, weighing should be linked to the exact location of the eu-, poly-, and metahemerobe patches and related to the function of the given area in the landscape structure. Such a classification requires further research. From the aspect of landscape ecology it would be an important step forward to determine multiplying factors for each hemeroby category (Table 3).

Table 3. Multiplying factors for the hemeroby levels

Hemeroby level	Multiplying factor
Oligohemeroby	1
Mesohemeroby	2
α -euhemeroby	4
β -euhemeroby	8
Polyhemeroby	10
Metahemeroby	15

Weighed hemeroby values of microregions in the study area are presented in Table 4.

Table 4. Weighed hemeroby values of the study area (highest values for the individual microregions are shown in bold)

Microregions	oligo-hemerobe	meso-hemerobe	β -eu-hemerobe	α -eu-hemerobe	poly-hemerobe	meta-hemerobe
Eastern Cserehát	36.9	23.8	190.4	16.8	0.0	22.5
Hernád Valley	13.3	16.0	288.0	4.8	0.0	91.5
Szerencsköz	6.3	8.2	344.0	5.6	1.0	42.0
Taktaköz	28.5	10.6	236.4	7.2	3.0	88.5
Harangod	4.6	4.0	348.4	8.0	0.0	79.5
Szerencs Hills	19.1	13.0	238.4	79.2	1.0	72.0
Tokaji Hill	34.4	3.4	61.6	342.4	4.0	79.5
Tokaj Foothill	40.9	17.4	92.0	191.2	0.0	52.5
Abaúj Foothills	28.4	25.0	214.8	13.6	0.0	55.5
Central Zemplén	85.5	16.2	13.6	16.0	0.0	15.0
Hegyköz Hills	30.0	26.0	202.8	9.6	3.0	72.0
Vitány Horsts	77.1	22.0	43.6	0.0	0.0	15.0

The dataset is the *numerical manifestation of the degree of anthropogenic impacts with the spatial ratios duly taken into account*. If the weighed hemeroby values for each microregion are summed up the degree of anthropogenic load on the landscape can be calculated. The resulting parameter can be called the hemeroby index (Table 5).

Table 5. Hemeroby indices of the microregions in the study area

Code	Denomination	Values
6.8.53	Eastern-Cserehát	290
6.8.61	Hernád Valley	414
6.8.62	Szerencsköz	407
1.7.11	Taktaköz	374
1.9.33	Harangod	444
6.7.22	Szerencs Hills	423
6.7.21	Tokaji Hill	525
6.7.23	Tokaj Foothill	394
6.7.12	Abaúj Foothills	337
6.7.11	Central Zemplén	145
6.7.31	Hegyköz Hills	343
6.7.32	Vitány Horsts	158

Figure 3 shows the classification of microregions based on hemeroby indices.

The method presented here should be considered as a first approach that is to be refined and made more exact by detailed investigations. However, the method in its present form is already a step forward as the quantification

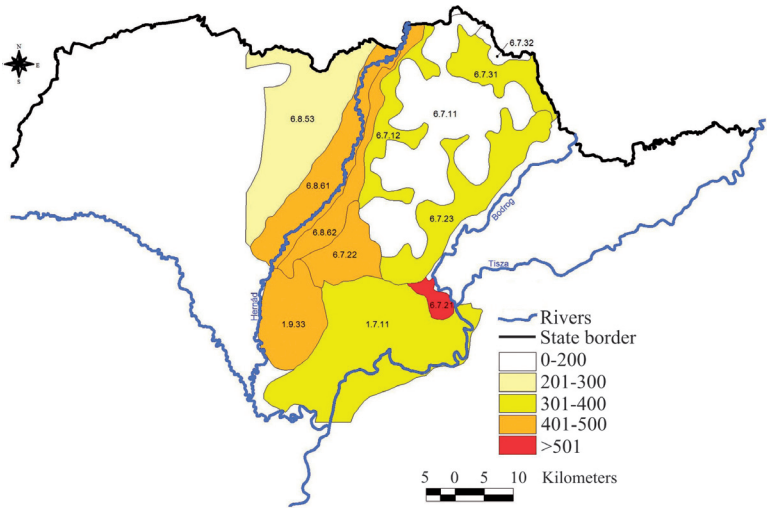


Figure 3. Hemeroby index map of the micro regions of the study area

of human impact on microregions of the study area and of their differentiation has been accomplished.

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Changing spaces of knowledge-based business services in Hungary

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Abstract

Recently, the process of networking and knowledge production in business services has been widely discussed in the context of the liberalisation of the services' market in the EU, and of the integration of the emerging economies into international flows resulting in changing spatial division of labour, thus shaping an increasingly diverse geography of business knowledge in Europe. Although information technologies support the spread of business knowledge, proximity and accessibility 'still matters' due to the significance of personal contacts in knowledge-based activities, moreover, in new market economies, to the low level of adoption of ICT in rural areas and the uneven development of infrastructure. Therefore, the spectrum and quality of business services available in smaller (lower-rank) service centres conditioned local/regional economic development, by linking local markets and agents to interregional (international) flows in new market economies. In this paper, the flow of business-related information and knowledge shall be put in the focus, as an aspect and a source of uneven development and dependence in new market economies, under Neoliberal capitalism. The geographical scope of the following analysis embraces Hungarian cities and towns as business service centres, highlighting how non-metropolitan urban centres (thus, local economies outside the Budapest region) grew increasingly dependent on the capital city-centred knowledge and information flows, how such centres were highly differentiated by the erosion of local basis for information-based activities, moreover, how this process was reinforced by national as well as by EU-policies, reproducing uneven development and backwardness in peripheral regions of a new market economy.

Keywords: business services; knowledge economy; global flows; new market economies

Introduction: New market economies in global flows

It was the very first time in 2004, when several East Central European² county towns appeared in the country reports of international property consulting

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² 'East Central Europe' (ECE) is considered as a product of re-positioning post-socialist countries inside the post-Cold War Europe by many political geographers (see e.g. YOUNG, C.–LIGHT, D. 2001; PAASI, A. 2001; ZIEGLER, D.J. 2002; JACKSON, L. 2004). The term has been

firms. Including cities outside the metropolitan region of national capitals in such reports indicated the changing position of smaller regional centres (by European scale, medium size towns) and their regions in global flows, primarily, as potential targets for distribution based activities (retail and logistics) and 'back office' business services for developers. This in turn rested upon a series of reforms for constructing a framework for highly liberalised market economies, driven by the mechanisms of the financial markets (IMF, World Bank) as well as by the bureaucratic institutions of the European Union during the 1990s (STENNING, A.–BRADSHAW, M. 2004; PICKLES, J.–SMITH, A. 2005; HARVEY, D. 2005).

At the time of EU-accession (2004), ECE countries were considered 'established' market economies, embedded into an increasingly dense network of business relationships³. The role (share) of the region in the international division of labour rested largely on a reasonable combination of advantages of geographical proximity, labour price and quality (skills) and of the stability of legal/institutional conditions. The embeddedness of East Central Europe into global flows through the European market (its core countries) was reflected by the dominance of EU15 investors in the region, and also by the structure of their investments, focused largely on lower value added elements of the value chain and on distribution-based services (Eurostat, 2008; BARTA, GY. 2005). However, the 'Visegrad Four' that received the earliest and altogether the largest impetus of investments amongst emerging (post-socialist) markets were characterised by an increasing sectoral diversity and business relationships, that was reflected by the rising share of re-invested profit in FDI and also by the growth of international trade in the service sector. Nevertheless, the latter – particularly, the accumulation of national deficits in the trade of business services – also revealed the increasing dependence of ECE countries on the core regions in terms of business information and knowledge⁴.

In 'new economies' the establishment of the market institutions produced a highly centralised structure in information and knowledge flows.

used widely recently, nevertheless, its boundaries are not clear. The most pronounced bordering process was/is tied to the enlargement of the European Union ('Europe as an institute' [PAASI, A. 2001]), however, extending the boundaries of Central Europe eastward did not involve the post-socialist countries of the East Balkan in this geographical (geopolitical) category. Thus, East Central Europe is definitely post-socialist, but has uncertain geopolitical boundaries, that are subject to political and academic discourses and have historical ('pre-socialist') roots. Nevertheless, the 'Visegrad Four' countries, including Hungary to be discussed here have been considered as part of ECE politically and economically during the past 20 years.

³ Statistically, the 'integration' process was reflected by increasing share of transnational corporations (TNCs) in gross national products and particularly in export activities (Eurostat Yearbook 2008)

⁴ Magyarország 2007. KSH (Hungarian Central Statistical Office), 2008; www.ksh.hu

(BLAŽEK, J. 2004; NAGY, G. 2005; FURMAN, J.L. 2001; KORCELLI, P. 2005). The emerging information monopoly of capital cities was largely supported by the EU-accession (the equal treatment of EU-based firms, eased cross-border transactions, etc.) and the further liberalisation of flows of services in the European Economic Area. Changing macro-economic conditions stimulated a new wave of influx of capital into the 'new member-states', that reinforced centralised spatial structures in the region, through setting up new regional headquarters of EU15-based firms' eastward expansion and also by the increasing off-shoring activity of transnational corporations that were focused primarily on metropolitan regions (NAGY, G. 2005; FURMAN J.L. 2006; NAGY, E. 2007). The centralisation process was supported also by the newly established national bureaucratic institutions to control the distribution of EU-funds, that opened up the way not only for centralising the distribution of such resources (particularly, in new democracies where bargaining power of regions is relatively weak politically and economically)⁵, but also gave stimuli to the rise of networks of experts centred on the capital city – the emerging 'class' of project-related information brokers.⁶

Nevertheless, '*non-metropolitan*' centres outside capital cities also grew as mediators of information and knowledge. Their position was established and reinforced in the transition period (1990s) when local agents (labour, enterprises, and local governments) were forced into permanent adjustment to the rapidly changing (increasingly liberalised) market conditions. In the early 2000s, the dynamism and economic prospects of such centres in the new power structures was defined increasingly by the multi-layered networks of relationships, that embraced not only the town/hinterland nexus (based on the control of local agents over different forms of capital), but also on i) changing relations to the capital city as the command centre of market regulation and the mediator of business information and knowledge (GÁL Z. 2000; WÁGNER, I. 2004; NAGY, E. 2005) ii) and on organisations i.e. firms and institutions driving global flows (AMIN, A.–THRIFT, N. 2002; HARVEY, D. 2005). This process was stimulated by adopting neoliberal national policies (e.g. shrinking the public service sector and liberalisation of flows) and largely supported by local elites⁷ seeing their interests in globalisation that manifests in *neoliberal urban policies*,

⁵ E.g. the 'New Hungary' Program that is the national framework for the distribution of EU (primarily, ERDF) funds (2007–2013) was an initiative for a decentralised development policy (rested on NUTS 2 regions) in 2005/2006. The program was re-worked several times and its ultimate form is characterised by a strict control exercised by the departments (ministries) of the national government headquartered in Budapest, providing only 30% for regional operational programmes. The control of regions (local agents) over ERDF-resources was limited to particular sectors that rest on 'local potentials' (e.g. tourism).

⁶ After the EU-accession, about 3,000 firms were identified as the agents i.e. products and re-producers of the 'project-economy' in Hungary (KOVÁCH I.–KRISTÓF L. 2005).

⁷ Primarily, the officials of the local government in key positions (TIMÁR J.–NAGY E. 2007)

such as supporting the influx of FDI into the local economy⁸ (HARRIS, N. 2002; RACO, M. 2005; SKLAIR, L. 2001) and urban rehabilitation projects linked to the development of international tourism (SMITH, N. 1996; TIMÁR J.–NAGY E. 2007). Intensified flows re-shaped the relationships of such urban centres: they were integrated increasingly into global networks characterised by flexibility and contingency, that made the agents of local economies were increasingly dependent on the flows of information and knowledge (CASTELLS, M. 2000).

In the followings, *the flow of business-related information and knowledge* shall be put in the focus, as an aspect and a source of uneven development and dependence in new market economies – under Neoliberal capitalism. The geographical scope of the following analysis embraces *Hungarian* cities and towns *as business service centres*. These shall be put in the context of the changing and increasingly differentiated geography of knowledge-intensive business services and the changing division of labour inside Europe (second section). In the third section the emergence and the structural and organisational changes in the knowledge-intensive business service sector shall be discussed in the context of the transition and of the integration of the Hungarian economy into global flows. The analysis rests on the review of statistical databases (Eurostat; Central Statistical Office, Hungary), and also on a survey focused on business strategies, activities, and externalising business services amongst users and providers of services in three sample areas in Hungary⁹. In the fourth section, the changing geography of knowledge-intensive business services shall be discussed, as a source for dependence and backwardness.

The diverse geographies of knowledge-based business services

In widely discussed concepts that interpret the contemporary economy as overlapping, mutually constitutive and constantly changing *networks* of firms, production systems and places (CASTELLS, M. 2000; AMIN, A.–THRIFT, N. 2001; DICKEN, P. 2003), the *providers of knowledge-intensive business services* are con-

⁸ Probably, the most spectacular process was the influx of retail capital in small i.e. non-metropolitan centres that re-shaped the urban landscape (core areas as well as the fringe) rapidly. Retail restructuring was supported by the local government throughout ECE to accelerate modernisation of the sector and capitalize it politically in the 'post-shortage' societies.

⁹ The demand-side questionnaire survey was completed in 2001. Altogether 181 questionnaires were received and reviewed. The sectoral distribution of respondents corresponded with the structure of the national GDP, and also spanned the urban hierarchy. The survey was focused primarily on the largest urban centres that have dominant role in their region in providing business services. The survey was focused on three sample areas of which, each embodied a type (a model) of regional development. The supply side was 'mapped' through structured interviews (37) on the same sample areas.

sidered as primary agents (in many cases: gatekeepers) of information and knowledge flows. Business services provide a framework also for embedding international agents (e.g. TNCs' branches) into local/regional networks: they act as mediators easing governance tensions (e.g. by interpreting regulations, managing firm/state conflicts, etc.), bridging cultural differences, and help the accumulation and transmission of relational assets and tacit knowledge (related to a particular milieu) (FLORIDA, R. 2002; GERTLER, M.S. 2003; THRIFT, N. 2006). In this way, business service providers support local economic development by embedding firms (branches) entering the local market, improve the local branches' bargaining power in intra-firm relations and involve local agents in international networks (LINDAHL, D.P.–BEYERS, W.B. 1999; DANIELS, P. 1999; DICKEN, P.–MALMBERG, A. 2001).

Recently, the process of networking and knowledge production in business services has been discussed in the context of the liberalisation of the services' market in the EU, and the integration of the emerging economies into international flows, that resulted in changing spatial division of labour. (FAULCONBRIDGE, J.R. 2006; JONES, B. *et al.* 2008). Consequently, the geography of business information and knowledge grew increasingly diverse in Europe. Nevertheless, different forces and processes were/are at work that stimulate structural, organisational and spatial centralisation as well as decentralisation processes.

(i) Due to the complex and uncertain business environment, *networks* are (and will be) considered as sources of creative work (problem-solving services), flexibility and also stability, that maintain the dominance of small scale businesses in many segments of services. Although, networks can (very often, do) operate through ICT channels involving many experts in a number of interactions, the dispersion of knowledge-intensive services is constrained by the heavy centralisation of business-related decisions (firms' headquarters), the need for personal contact (for mutual trust and understanding of service providers and users), moreover, the concentration of knowledge (senior experts) in a relatively few major institutions – focusing also the opportunities of knowledge spill-over and providing favourable living conditions for the 'creative class' (SASSEN, S. 2000; FLORIDA, R. 2002; HUGHES, A. 2007).

(ii) In parallel, technology-based, as well as standardised services are organised in more centralised and hierarchical structures. Localisation of such services rests largely on classical cost factors, such as the price of qualified labour, that stimulated outsourcing (in many cases: off-shoring) of such activities (BRYSON, J. *et al.* 2004), that targeted also the eastern periphery of the European market.

The changing geographies of knowledge-based business services put the economic development of non-metropolitan centres/regions of East Central Europe into a new context. Although, information technologies support the spread of business knowledge, *geography* (accessibility) '*still matters*,' largely

due to the low level of adoption of ICT in rural areas, the significance of personal contacts in information-based activities, and the uneven development of infrastructure (transportation; broadband data transmission, etc.) (ERDŐSI F. 2005; NAGY, E. 2005; NAGY, G.–KANALAS, I. 2009). Therefore, the spectrum and quality of business services available in small and medium size towns is highly influenced (and also indicates the trends of local/regional economic development,) by the linking of local markets and agents to interregional (international) flows in new market economies.

Transition, integration and the development of knowledge-based services in Hungary

Hungary was the scene for a rapid integration into the new ‘Neoliberal’ order of the world by the early introduction of a legal and institutional framework of the market economy, large scale privatisation schemes and encouraging (receiving a relatively high amount of) foreign direct investments (FDI). The increase in the number of international agents that entered the market was unprecedented¹⁰, however, the investment rush calmed in the 2000s and international agents focused increasingly on (i) extending/stabilising their regional networks (involving domestic sub-contractors, reinvestment, e.g. by developing local/regional service basis) (ii) exploiting human resources locally (e.g. off-shoring knowledge-based services from Hungarian firms and institutions) and (iii) capitalising geographical potential by distribution-based service developments (retail, logistics) (BARTA, Gy. 2005). Property market trends as well as changes in employment and value-added structure clearly reflected the shift towards services, especially, to information and knowledge-based activities (*Table 1*).

In parallel, Hungary-based firms grew active in East Central Europe and the Balkan increasingly from 2000 onwards¹¹, by exploiting the privatisation process (e.g. in the energy sector and manufacturing) and also by green-field developments (e.g. in the property sector). Although, large scale projects were major investments by Hungarian corporations, thousands of small firms were founded in border regions, relying basically on cross-border links in the service sector (SZÓNOKYNÉ ANCSIN G., 2004). The increasing involvement in international (cross border) issues made Hungarian firms increasingly dependent on information and knowledge either provided by business service firms or getting it through informal (personal) networks (NAGY, E. 2007).

¹⁰ The number of firms with foreign capital (foreign share: over 10%) rose from 8 up to 25,000 (1988–1998). By 2007, the FDI in the owners’ equity exceeded 96 billion USD.

¹¹ Hungarian capital invested abroad rose from 1,5 billion USD up to 36.2 billion in the discussed period (2000–2007).

Table 1. The share of services within gross value added in Hungary (current prices, 1991–2007)

Sector name	Other services	Finance & Insurance	Business services	Other services	Finance & Insurance	Business services
Sector-code	J-O*	J	K	J-O	J	K
Year	HUNGARY			BUDAPEST		
1991	30.0	4.1	9.4	..	..	..
1992	33.2	3.7	10.8	..	..	..
1993	35.2	4.1	11.6	..	..	..
1994	37.4	5.6	12.0	..	..	..
1995	35.2	5.3	13.6	51.0	9.4	19.5
1996	35.5	5.4	15.9	51.3	9.5	21.8
1997	33.8	4.5	14.6	48.5	8.2	21.0
1998	33.8	4.1	15.0	49.2	7.9	21.8
1999	34.8	3.9	16.1	50.3	7.5	22.9
2000	35.1	4.0	16.8	51.7	..	..
2001	37.7	3.1	15.6	53.0	6.3	25.4
2002	39.5	3.4	15.6	53.8	6.6	23.7
2003	38.5	3.7	15.1	54.5	7.5	23.1
2004	37.7	3.4	14.4	53.7	7.6	22.9
2005	38.7	4.0	14.7	55.4	8.2	23.7
2006	38.9	3.9	15.4	56.8	8.0	24.0
2007	43.1	4.5	18.0	..	..	..

* NACE codes are used, compatible with Eurostat nomenclature.

Source: National accounts of Hungary, 1988–2006. Central Statistical Office, Budapest, www.ksh.hu

The market liberalisation process, as well as the entry of TNCs resulted in a radical turn in the scale and structure of international relations.¹² The process (particularly the restructuring of international business relations) was highly influenced also by the entry of Hungary into international organisations (OECD, NATO, EU). The EU-accession (as well as the programs/projects supporting it) stimulated a development in planning management skills and capacities of business and public organisations ('learning' EU bureaucracy), as well as in information-related services (e.g. management consultancy) that provided support for the adaptation to EU-standards. This process was supported also by the programmes¹³ that targeted the 'physical' integration (energy, transport, ICT) of the economy in pan-European networks.

As a consequence, the global embeddedness of the Hungarian economy has been considered amongst the 'World Top 20' since 1998¹⁴. Whereas crises in 1994 and 1997 did not have a significant impact on the performance of the

¹² The export grew from 8 billion USD up to 73.5 billion (1990; 2007), while the national import rose from 10 billion USD to 74 billion (current prices).

¹³ E.g. PHARE CBC and ISPA programmes.

¹⁴ See the calculations of the World Bank and the OECD.

Hungarian economy, the global hits from 2000s on (dot-com collapse, rise of global terrorism, the 2007 mortgage crisis, etc.) heavily affected it, e.g. by withdrawing investment schemes, slowing down the technology transfer, and by restructuring resources amongst regions (MOLNÁR, B.–SZÉPVÖLGYI, Á. 2005). Therefore, we may presume, the uneven (spatial) development was governed basically by the global embeddedness of local economies from the late 1990s on.

In the early years of the transition (1989–1996), the rapidly changing business environment, such as the liberalisation process and the emerging legal and institutional framework of the market economy stimulated a growing demand for advanced producer services. This process was supported not only by a market pressure for learning and adaptation (consequently, for buying/externalising services), but also by the enterprising ‘rush’¹⁵. Thus, the increasing demand stimulated a rapid growth in the sector (e.g. in the number of service providers), particularly, in accounting, auditing, management, marketing and legal consultancy. In this period, due to the high uncertainty of market conditions stemming from the ‘post-socialist’ transition process, and from the unsettled business relationships and ethics, personal ties had a specific part to play: they supported minimising risks and substituted for a lack of quality control systems and references. Business service firms of overwhelmingly small scale (employing less than five persons) rested on capitalising the knowledge, professional experience and personal relations of the founders (owners). They were mostly ‘generalists’, providing ‘routine’ services for a wide spectrum of clients supporting their operation, however, they also offered specialised, knowledge-intensive services for prosperous and innovative partners¹⁶. (NAGY, E. 2005) As earlier empirical studies¹⁷ suggested, in this period, the Neoliberal scheme for the post-socialist transition into a ‘market economy’ resulted in an increasing dependence on business information/knowledge and its providers.

From the late 1990s on, structural changes, such as the emerging ‘post-transition’ business milieu (i.e. declining inflation and interest rates and the consolidation of the legal and institutional framework of the national economy), the expansion and increasing regional/national embeddedness of TNCs, as well as the improving performance of domestic enterprises stimulated

¹⁵ As a result the number of domestic firms doubled between 1989 and 1996.

¹⁶ Interviews made with executives of 37 APS providing firms in 2001 suggested that, personal relations and reputation that rested on expertise were the essential elements of firm strategies in the early years of the transition. Furthermore, expertise was a basis rather for the broadening of the range of services provided than for adapting strategies focused on differentiation.

¹⁷ A questionnaire survey as made in 1993 in Szeged, gathering information about the activities and strategies of 57 local service providers in Szeged. In 2001, another survey was made in three sample areas in Hungary, about the business strategies, activities, and externalising business services amongst users (buyers) of services.

growth and also *differentiation in the demand for advanced producer services*. The shift towards an internationally embedded, increasingly information-dependent national economy was a highly selective process and resulted in segmentation of the market for business knowledge and information. The group of users was split up into two major pools:

i) an international one of advanced producer services dominated by powerful agents (dominantly, by TNCs), however, included also a group of 'globally linked', highly adaptive and dynamic domestic small and medium size enterprises in an increasing number, that benefited from the dense network of business relationships within major cities and/or in flexible production enclaves.

ii) a 'static' cohort of users that relied upon local markets (small, often family-run, enterprises with modest sales revenues suing chiefly routine services supporting their operations).

The growth of knowledge-intensive services, particularly, tax, legal and management consulting, IT and HR-related services was driven chiefly by the transnational and the dynamic domestic groups of users embedded into international networks. However, the demand was segmented also along business activities lines: producer services (in particular, business service firms) were highly over-represented amongst the users of a wide spectrum of information/knowledge-based services, while innovative manufacturing enterprises sought for legal and computer services, technical consulting and (more scanty for) R&D from external providers.

The above trends stimulated structural and organisational changes in the sector of knowledge-intensive business services. It was a highly dynamic and an increasingly international sector, that was reflected by the rising amount (and share) of FDI in the sector, and also by the expansion of international service providers¹⁸. The increasing complexity of tasks and of the business environment (e.g. the launching of EU regulations in auditing), and the introduction of international standards in the production process spurred the differentiation of service providers. There was an increasing gap between the major international agents and domestic (dominantly small scale) firms¹⁹ as well as within the latter group, such as between dynamic (adaptive)

¹⁸ The share of sector 'K' rose from 7,3% up to 22% in foreign direct investments (1996–2007), moreover, the stake of foreign owners in joint ventures was also increasing. (Central Statistical Office, Hungary: www.ksh.hu; Figyelő Top 200, 2007).

¹⁹ The 'big four' has a 42% stake on the market of auditing and business consulting in Hungary, as major TNCs' subsidiaries rely on their services due to the complexity of tasks and increasing risks. The choice of service providers (as a strategic decision) is made 'outside' the national market, by chief executives in the TNCs headquarters. Meanwhile, 22 domestic medium size firms stabilised their position on the domestic market. They provided services (auditing, consulting) for dynamic domestic enterprises and subsidiaries of smaller international agents (SMEs). (Figyelő Top 200, 2002, 2003, 2004, 2005, 2006; Sanoma: Budapest.)

agents and firms pursuing more 'static' business strategy, as our 2001 survey suggested. (i) The majority of business service firms employed a 'generalist' or a 'mixed' strategy in the early 2000s, due to their limited access to capital, skilled labour and the lacking 'critical mass' of demand for specific (information-based) services in their region. (ii) Nevertheless, there was a trend toward specialisation, particularly in highly knowledge-intensive sectors, such as engineering consultancy, R&D and computer services. This dynamic (however, rather heterogeneous) group of domestic service providers relied basically on skilled labour, the extensive use of ICT in daily routine, business planning and strategic decision-making, and their highly structured professional and business partnerships, that support innovations at firm level, that in turn, stimulate growth and structural changes in their region (LINDAHL, D.P.–BEYERS, W.B. 1999; NAGY, E. 2005).

The liberalisation of the market of services, and the EU-accession of new market economies gave further stimuli to structural changes in the organisation of business information flows in the 2000s. Business services were outsourced (increasingly: off-shored) from East Central Europe (e.g. legal consulting, risk management, management consulting) by the firms of the

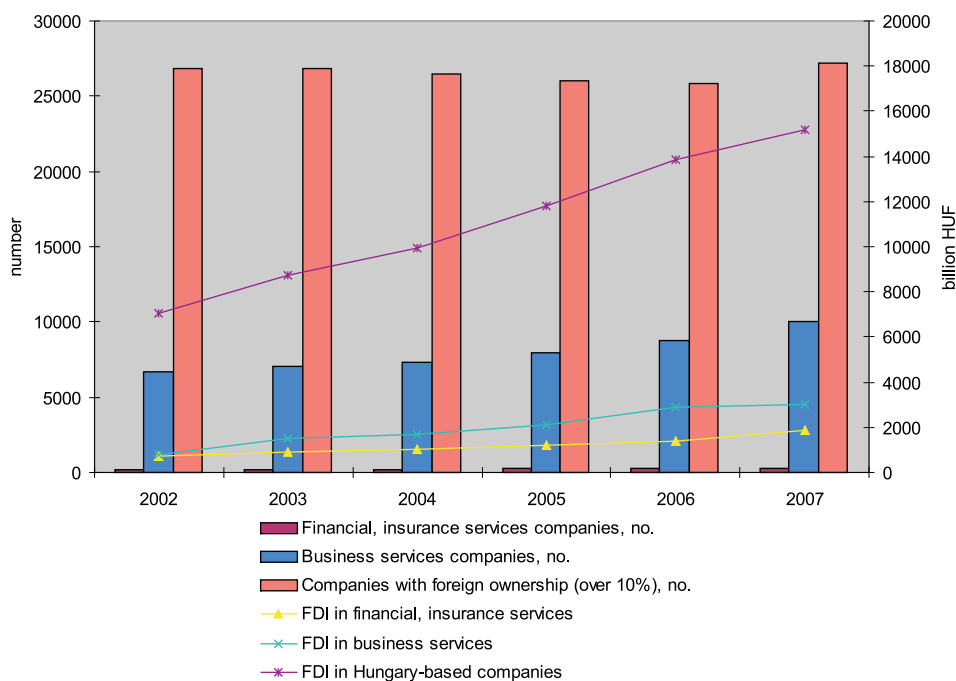


Figure 1. FDI in business services, 2002–2007

Source: Central Statistical Office, Hungary 2002–2008; www.ksh.hu

'core economies', and service providers introducing 'niche products' also entered the market (e.g. in public relations and advertisement) (PALÓCZ, É. 2005; GEREFFI, G. 2007; FALK, M.–WOLFMAYR, Y. 2008). Hungary was also particularly targeted after the EU-accession by international firms' strategies that resulted in an increasing involvement in flows of business services: foreign direct investment grew dynamically in sector 'K' (Fig. 1). Moreover, the external trade of business services was spurred by the above processes: it exceeded the growth rate of the rapidly increasing national export (about 10% annually) in the post-accession period. Nevertheless, the negative balance of trade of business services (in intra-firm relations, as well as in international trade) reflected also the dependence of the national economy on external sources of knowledge and information. A change in this trend was indicated by the positive and improving balance in IT-related services (2006–2007), and recently by rising export of R&D activities.

The differentiation of service spaces

In the early 1990s, the geography of the sector was shaped by flows resting on the transition of the regulatory system and on the entry of domestic agents on the market *en masse*. Small scale domestic firms that responded to the increasing demand relied largely on qualified labour available locally, moreover, social (network) capital accumulated under the centrally planned system. In this way, the capital city, the centres of higher education and of public administration grew as the primary and secondary centres of flows of knowledge and information. Nevertheless, the emerging hierarchy was challenged by the consolidation of the legal and institutional framework of the national economy, the entry and expansion of international enterprises and by the improving performance of domestic firms.

In the late 1990s, a dualistic structure emerged on the market of knowledge-based business services (see the previous section), that manifested itself in the geographical centralisation of users and providers of specialised services supporting global embeddedness, moreover, in the information (knowledge) monopoly of the capital city. This increasingly polarised structure was reinforced by the significance of personal relations (contacts) in knowledge exchange, by the high spatial concentration of demand due to the 'urban bias' of using such services, and the uneven development of ICT and transportation networks.

The shifts in the geography of knowledge-based business services were increasingly selective and they have re-organised the hierarchy of urban centres in Hungary. To understand the impact of recent changes discussed above, *the shifts in the role (weight) of business service centres were analysed*. Firstly,

routine (regularly used) services²⁰ that are heavily dependent on accessibility and face-to-face contact (therefore, reflect the size of the local/regional market) will be reviewed to reveal the changing status of towns in the urban hierarchy and also the regional differentiation of the urban network. Secondly, particular groups of specialised services (highly reliant on information flow and skilled labour) shall be analysed as key agents of international embeddedness (R&D, software services; financial mediation/brokerage; to go into further details, advertising; management consultancy; market information; management consulting), that all were considered as keys for changing business strategy and setting up new (international) market relations by the firms we surveyed in 2001²¹. The post-2000 period was put into the focus of the analysis, when Hungary was considered as a 'settled' market economy, shown by the changing strategies of foreign investors including service providers in an increasing number (BARTA, Gy. 2005). Moreover, shifts in spaces of business services also indicate the spatial impact of the changing position of new market economies in European flows, such as off-shoring of knowledge-based activities (GÁL, Z.-Sass, M. 2009).

The hierarchy of service centres was dominated increasingly by *Budapest* and the surrounding belt of suburban centres (small towns). (Fig. 2) This information monopoly emerged along several dimensions, such as i) the concentration of highly specialised service firms rested on specific skills and knowledge, ii) intra-firm division of labour competencies inside the networks of firms headquartered in the capital city, and iii) the concentration of international agents of business services in Budapest. The capital city's position was supported also by the FDI in distributive services targeting primarily this region (Koós, B. 2004). County towns were scenes of decentralisation of particular service activities (e.g. back-office functions; personal contact points for customers; information collection) (RAFFAY, Z. 2005; WÁGNER, I. 2004), but, such processes rather supported than challenged the centralisation process at national level.

²⁰ Accounting; auditing; tax and legal consulting; marketing; management consulting; engineering services; advertisement; security services.

²¹ The selection of towns and cities that were defined as nodes of business information flow rested on statistical calculations. Firstly, the most important business service centres of the country were identified, which were determinant nodes in the number of locally existing firms, in the per-inhabitant, as well as in and per-company indices. Secondly, the centres of regional importance were clustered, those providing an access to business information demanded by local businesses. The choice of the centres rested on earlier studies, such as a research on 'Regional trajectories of economic restructuring' (2001), a gravity model of spaces of advanced producer services (NAGY E. 2002), and a questionnaire survey focused on the demand for business services in three regions that took different development paths during the transition period (NAGY E.-GÁL Z.-MOLNÁR B. 2002).

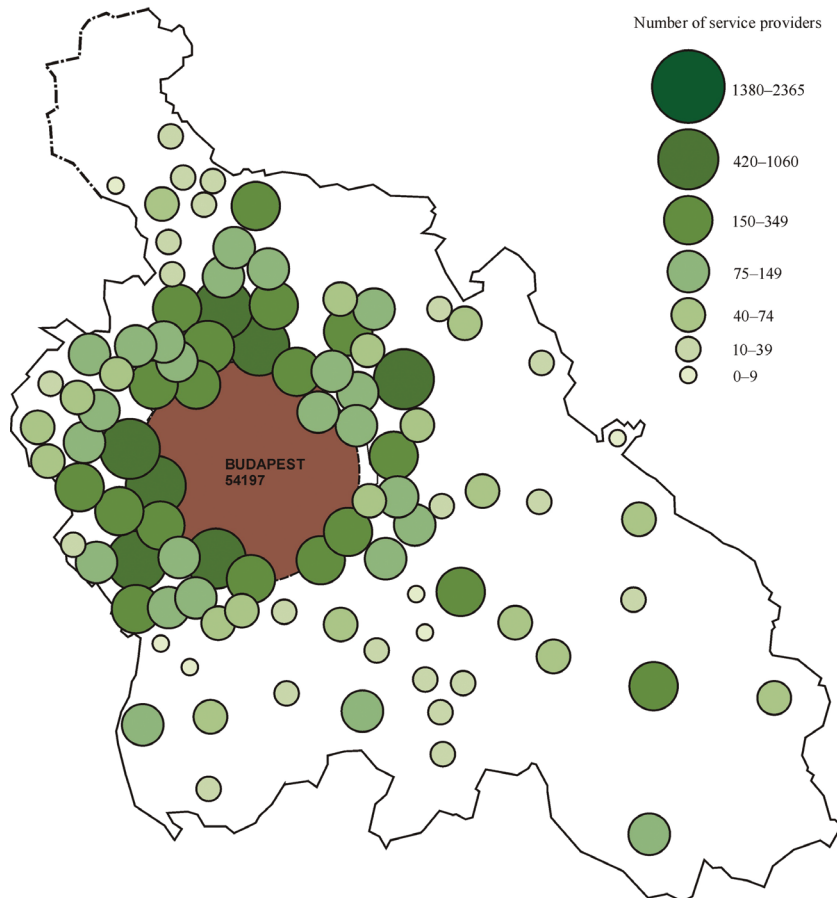


Figure 2. Business service centres outside the Budapest region, 2007

Source: The authors' calculation based on the database of Central Statistical Office „Cég-Kód-Tár”

The development of business services (through a positive feedback mechanism) was a source of *regional differentiation* of the urban network. The direction and scale of changes in 'routine' services rested largely on the size of local/regional economies, the dynamism of development, particularly, on the growth of small and medium size enterprises (SMEs). The following shifts were characteristic of the changing spaces of business information flows:

- Although, the international embeddedness of the national economy was deepened, therefore, the need for information was increasing in the discussed period, the relatively centralised spatial structure of oft-used business service remained, that was reflected by the increasing share of Central Hungary (including the capital city and its wider urban region).

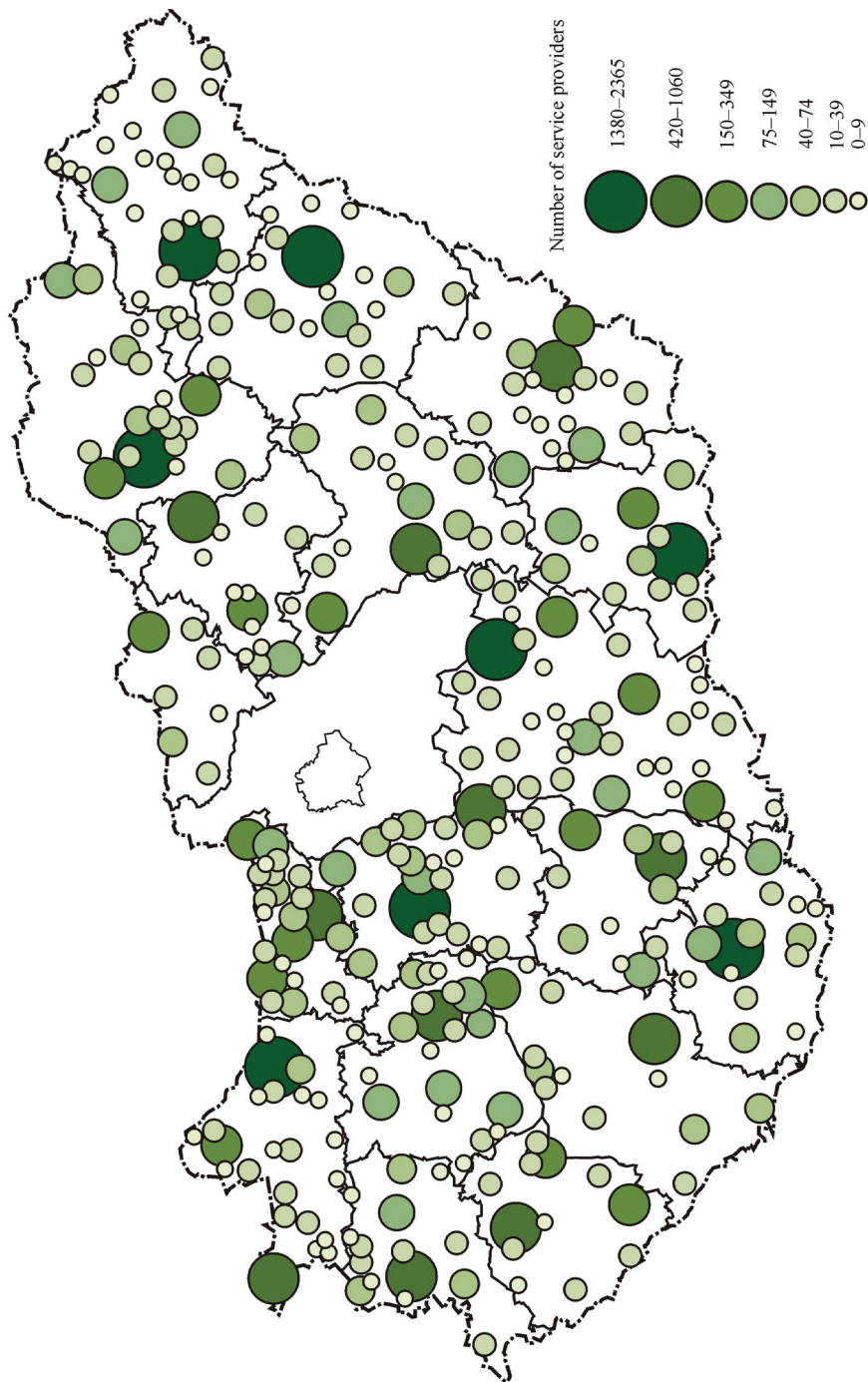


Figure 3. Business service centres outside the Budapest region, 2007

Source: The authors' calculation based on the database of Central Statistical Office „Cég-Kód-Tár”

– The development of routine services was highly dependent on the regional economic milieu: the proximity of TNCs (particularly, those involved in manufacturing) embedded into regional networks in the post-Fordist industrial enclaves had a basically indirect stimulating effect on services. Domestic enterprises integrated into international networks shaped by TNCs represented a highly structured (diverse) demand for business services and resulted in a relative improvement in the position of the centres, at higher, as well as at lower levels of urban hierarchy (up to 15,000 inhabitants) (*Fig. 3*).

– The suburbanisation process around the capital city (Budapest) had a direct effect on the spatial structure of economic activities also in the period 2000–2007: the growing suburbs had an increasing stake in the sector. This process was fed by FDI in services, and also by the rising number of local SMEs providing business services. It is very likely that this trend was supported also by residential suburbanisation in the form of the flight of highly qualified staff of such services from the capital city. Most of the small towns in this region have very high penetration rates in oft-used business services, as compared to the countryside centres in the same level of population (*Fig. 2*).

– In the economically lagging regions, two distinct development trajectories emerged. *In the first case*, the spatial structure was highly concentrated even in ‘routine’ business service activities, and it has not changed remarkably since 2000. As a consequence, only a few major centres offer business services for a wider region. Thus, even basic information for running businesses are not available for local agents, that reinforces the accumulation of backwardness, particularly, in the peripheral regions with poor IT and transportation infrastructure (*Fig. 3*).

– *The second type* offers more chances for development, as the access to business information (routine or oft-used services) is available for a wider range of local businesses, due to the larger number and a denser network of small and medium size towns. In this case, the relative closeness of business service centres resulted in better provided regions (*Fig. 3*).

As far as the urban network as a whole is concerned, the most significant change was the increasing regional imbalance in favour of the capital city’s region. Moreover, slightly more than one hundred towns were identified as business service centres supporting the ‘daily routine’ of local enterprises, but this group is highly diverse in terms of dynamism and the spectrum of services provided, and does not have a uniform spatial distribution. In this way, centralisation of capital and organisation in business services manifested spatially as a capital city/national economy dichotomy, as well as problem of accessibility to local markets of business information and knowledge that support the reproduction of backwardness. This process is underpinned by the Neoliberal scheme for reorganising the systems of public administration that focus institutions, i.e. qualified labour, knowledge and information into

Table 2. The changing significance of clusters (types) of service centres in selected types of knowledge-intensive business services (2000, 2007) (Hungary=100%)

Category	Management consulting		Marketing		Advertising		Databanking		Software development		Human resources management	
Year	2000	2007	2000	2007	2000	2007	2000	2007	2000	2007	2000	2007
Budapest	60.8	57.6	51.5	52.7	59.9	58.4	62.3	58.9	59.0	55.1	56.2	48.4
Pest county*	9.9	13.1	20.0	13.5	9.0	12.2	7.6	11.8	11.4	15.3	5.8	8.8
Regional centres (5)	10.4	9.2	11.1	12.5	10.9	10.2	9.1	8.9	11.0	10.3	10.2	9.2
Medium-sized towns (14)	7.3	7.3	6.7	7.3	9.3	7.9	9.6	7.1	6.8	6.3	10.0	8.5
Total	88.4	87.2	88.9	86.0	89.1	88.7	88.6	86.7	88.2	87.0	82.2	74.9

*Pest County is a unit of territorial administration, including the urban region of Budapest. Pest County and Budapest together cover the NUTS 2 region Central Hungary.

Source: The authors' own calculation based on the Company Code Register (Cég-Kód-Tár) 2000/4; 2007/4 of the Central Statistical Office, Budapest.

5–7 major county towns ('regional centres' in Table 2), stimulating the flight of intellectuals from smaller centres, and raising new barriers for being involved in information flows.

The highly and increasingly concentrated spatial structure of knowledge-intensive business services supporting international market integration and adaptation clearly support the centralisation processes discussed above. The activities listed in Table 2 are only sporadic in smaller centres and virtually absent from towns with less than 10,000 inhabitants. Local service providers in such small centres are not rooted in the local business environment rather they are focused on a niche of the national market using the possibilities offered by ICT networks. In general terms, the centralisation of knowledge- and information-intensive services was an ongoing process in the group of county towns. The only scene of de-centralisation was the urban region of Budapest: 24 small urban centres of the Budapest urban region 'climbed up' in the hierarchy, they occupy the same position as smaller regional centres (serving areas with 50,000–300,000 inhabitants) outside the Budapest Metropolitan Region – while the capital city has lost of its significance since 2000 (Table 2).

Conclusions

Construction of global networks of business relationships supported by the improved accessibility of peripheral/semi-peripheral regions and lib-

eralisation of international trade has re-drawn the economic geography of Europe: due to the incorporation of 'emerging economies' into international flows (division of labour), new dimensions of socio-spatial disparities have emerged or became apparent in the 2000s. In this framework, *East Central European countries* (and among them Hungary) are considered as open, flexible and adaptive, and therefore significant target regions of the extension of global business networks. In the past few years, the *outsourcing of business and logistics services* and the closer integration of local markets (as a continuation of former developments seeking to improve efficiency) have taken centre stage. As result, corporate relationships have expanded both vertically (in emerging supply/sub-contracting systems) and horizontally (competition; cooperation/alliances of firms). This process enhanced the need for business-related information *about local/regional markets* for international agents and also for business knowledge sought *by local firms* to adapt and survive. The growth and expansion of business services that produce and/or mediate such intangible assets re-interpreted (highly differentiated) the role of East Central European cities and towns.

Small and medium size towns grew increasingly dependent on external resources (TNCs investments; national/EU public resources) for supporting economic restructuring and improving quality of life, due to their scale (i.e. the less diversified economic base and relatively small bargaining power) and being in an early stage of capital accumulation. Success in gaining such resources has always been largely dependent on knowledge-related strategies of local agents (firms, public institutions) that very often lack capacities (e.g. skilled staff, expertise in information management) sufficient for being involved in information flows. *The dependence* of this group of towns on centres of producing information is enhanced by *highly centralised spatial structures in Hungary*: the Budapest region preserved its dominance in information flows in the 2000s, particularly, by focusing highly specialised services and strategic functions of firm hierarchies. Meanwhile, traditional service centres of small scale (below 100,000 residents) are highly differentiated by the erosion of the local basis for information-based activities.

Increasing dependence on the (business) service economy of the capital city was reinforced by national as well as by EU-policies, furthermore, by the deficiencies in functions and bargaining power of the major county towns due to their relatively small size and lack of regional institutions. In this way, knowledge and information-based activities remain highly centralised and the accumulation of backwardness is maintained, particularly in peripheral regions of the national economy that are hit by accessibility (and adaptation) problems in physical and virtual (ICT) terms. Thus, an increasingly polarised space of information flows was produced by the changing (increasingly, globally embedded) economic structures in the post-transition era in Hungary.

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The impact of tourism on subjective quality of life among Hungarian population

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Abstract

Nowadays the clarification of the issues concerning subjective *quality of life* (QoL) enjoys a priority both in the dialogue between academic workshops and in political quarters responsible for the general state of society. The researchers – let them be the representatives of philosophy, psychology, sociology, geography or economics – are keen on finding the paths towards the sources of happiness, the ways to achieve subjective well-being, whilst the politicians are eager to trace what could be done in this sense by the power. There has been a wealth of literature on the relationship between the achievement of overall life satisfaction and sustainability of political power, notwithstanding only minor emphasis was put on the travelling behaviour of population as a factor of QoL and, consequently, of happiness. The governments of bourgeois democracies tend to cherish the sources of happiness stemming from leisure time spending – driven not so much by the desire to extend their power in time, rather prompted by moral responsibility for the well-being of society. Writings on the ways how policies might promote leisure time spending with travelling are many, but it is hardly known how these efforts have been able to influence subjective QoL.

In Hungary, the National Tourism Development Strategy (2005–2013) attributes paramount importance to travelling of Hungarian population as one of the means to increase QoL – an effort unique even in international comparison. To attain the objectives formulated in this document, and in order to yield a profit for the society, the Tourism Unit of Ministry of Local Government and Regional Development (now Ministry of Local Government), together with the Hungarian National Tourist Office and Geographical Research Institute Hungarian Academy of Sciences had requested the Hungarian Central Statistical Office to perform a survey on the happiness markers related to travelling behaviour of the country's population. This survey by questionnaires conducted in 11,500 households in the year 2007 has surfaced relationships between tourism and QoL hardly acknowledged heretofore.

Putting the results of the survey considered representative with reference to the adult (18+) population of Hungary in the context of Hungarian and international literature, the present study provides an assessment of the tables of the data referring to the different variables. A special emphasis is addressed to the general linkage between travels and overall life satisfaction and to the components of happiness offered by travelling.

Keywords: tourism, quality of life, happiness, welfare, well-being, life satisfaction

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Introduction

The fact that changing one's usual environment helps to satisfy physical needs more effectively, namely relaxation and nutrition outside of the everyday space ensures a more intense regeneration, is among the well-known thesis of tourism sciences (PUCZKÓ, L.–RÁTZ, T. 1998; MICHALKÓ, G. 2007). But, generally the participation in travelling, or the concrete effect of a trip on the individual's happiness, is a less known issue. The theoretical outcomes of such an analysis result in a valuable knowledge not only for the social sciences, but also for the political sphere, as recognizing the importance of the population's quality of life is one of the criteria for modern government (BIANCHI, M. 2007). European Union institutions emphasise that focusing on quality of life is the responsibility of the government in power (at the time of this study 413 documents of the EU operative legislation⁴ include the term 'quality of life'). In Hungary, almost 100 laws or decrees include the term 'quality of life' in its text. The New Hungary Development Plan (NHDP)⁵ adopted in 2006 refers to the National Tourism Development Strategy (NTDS) as a 'beneficial' sector document. The NTDS is a strongly quality of life oriented strategy. All these point out that tourism has passed the one-sided focus of its economic and regional development function, because by now the Hungarian politicians have recognized the importance of its social role. Nevertheless, exploitation of the opportunities regarding development of quality of life still needs substantial research focusing on the cohesion of travelling and happiness.

Although studies focusing on quality of life date back for a long time also in Hungary (HANKISS, E.–MANCHIN, GY. 1976), academic tourism professionals has begun to recognize its opportunities only at the beginning of the 21st century (KOVÁCS, B.–MICHALKÓ, G.–HORKAY, N. 2007; MICHALKÓ, G.–LŐRINCZ, K. 2007). Besides the lack of the theoretical background, the one-sided statistical data collection, namely the demand/turnover oriented approach limited the launch of such a study. As of 2004, the results of the survey about the travelling habits of the Hungarian population conducted by the Hungarian Central Statistical Office (HCSO) provided more information about the relationship between tourism and quality of life. As a result of the interest from the political sphere and the academic circles, the cohesion between the travelling habits and the happiness in connection with it was analysed for the first time in 2007 where the sample was representative to the Hungarian adult (18+) population. The HCSO included a short questionnaire in the 2007 data collection, developed by a professional team included the Tourism Unit of Ministry of Local Government and Regional Development (now Ministry of Local Government),

⁴ <http://eur-lex.europa.eu/> download: 6 March 2008.

⁵ 1103/2006. (X. 30.) Government Order about the adoption of the New Hungary Development Plan.

the Hungarian National Tourist Office and the Geographical Research Institute of the Hungarian Academy of Sciences. The questions intended to trace the relationship between tourism and quality of life from three different aspects: firstly travelling as source of happiness, secondly effect of travelling to the quality of life, and thirdly subjective reflection at the destination.

The present study is a pioneer initiative in Hungary, it intends to analyse the correlation between travelling and happiness using a representative sample. This allows to point out the effect of household's size, education, age, income level and travelling habits/participation in tourism on the subjective QoL. This paper does not include the role of tourism at the destination, namely its local effects.

Effect of tourism on the subjective quality of life

Although wealth, position in the power hierarchy and the social status are the charismatic symbols of happiness in the developed world, the psychology considers the control over the consciousness as the base for the individual's quality of life, henceforward (CSÍKSZENTMIHÁLYI, M. 2001). First of all, it is up to the individual how to appreciate the life, whether to feel satisfaction or not, so happiness derives from internal harmony. CSÍKSZENTMIHÁLYI, M. (2001:77) points out in his flow analyses that 'In order to improve our life, we should improve our experiences'. Tourism is a typical activity where travellers experience a so called flow. This means they become active in leading their deeds, their feeling becomes a milestone of the experience. The perfect experience originated from the objective, preparation, energy input and concentration can be relieved during other trips which are expressed by the definition of life satisfaction, as VEENHOVEN, R. (2003) puts, it leads to the awareness of happiness. As tourism trips lead far away from spaces of everyday life, the exclusion of the factors disturbing consciousness and of everyday life impulses contributes to the relaxation, to the participation in the activity or to re-experiencing it.

The flow experience fulfilled by travelling can be reached both by leisure and business tourism. Meanwhile leisure tourists seek the empirical experiences in connection with the desired attraction, in the case of business trips, the fulfilment of professional success generates the flow itself reached on the way to it. Travelling needs a comprehensive preparation including defining the motivation, choosing the destination, ensuring the expenditure and organization (MÄSER, B.-WEIERMAIR, K. 1998; BIEGER, T.-LAESSER, CH. 2004). This allows defining tourism as a flow stimulating activity. The experience of standing before a worldwide known painting far from home fulfilling thereby a dream, or chatting after one's presentation at an international conference, all these need a significant input. Therefore the achievement induces happy

moments. These moments, alone themselves or together as a trip, can lead to life satisfaction.

Although tourism has been dedicated a core role in studies aimed at quality of life (CSÍKSZENTMIHÁLYI, M. 1998; NEAL, J. *et al.* 1999), academics has paid less attention to the effects of spending leisure time by travelling. The reason behind this can be explained by the late recognition of the correlation between tourism and life satisfaction among academics, as at the beginning of the studies on subjective quality of life, travelling was not included among the measured factors of value hierarchy (NEAL, J. *et al.* 2007; ROYO, M. 2007). In QoL studies starting in the 1960–70s, tourism had no separate image, although the number of international tourist arrivals reached 100 million by that time (WTO 2003). Freedom, the acquittance of work limitations naturally had a key role in different satisfaction models, but travelling became a significant segment of leisure time spending only later on. Its function was not so characteristic like today when the number of international tourist arrivals converges to one billion (NEAL, J. *et al.* 2004). The role of tourism in life satisfaction studies is highlighted by the fact that the internationally most acknowledged expert in happiness studies, RUUT VEENHOVEN's reference database contains only one study⁶ dealing with tourism. Meanwhile since the beginning of the 1990s, international bibliography has referred continuously to studies dealing with different aspects of the correlation between tourism and the subjective QoL (DOBOS, J.–JEFFRES, L. 1993; RICHARDS, G. 1999). The same cannot be said about the Hungarian professionals who ignored the topic. This is mainly due to the fact that basic research of life satisfaction in Hungary belongs to the competence of sociology which pays less attention to tourism. Meanwhile the 'Hungarostudy' research series of MARIA KOPP tries to approach QoL as complex as possible, it hardly recognises the effect of tourism to the increase of happiness. This can be explained by the study's orientation towards health sciences (KOPP, M.–PIKÓ, B. 2006).

Although tourism has got no lead in any international research on QoL, the factors which are monitored in most of the life satisfaction studies, are strongly interrelated with travelling (FEKETE, Zs. 2006; BRÜLDE, B. 2007). In Rahman's model, health, family, friends and work are in the focus, all of them – even to a different extent – are important motivations for travelling (KOVÁCS, B.–MICHALKÓ, G.–HORKAY, N. 2007). All these lead to health tourism, VFR (visiting friends and relatives) or business tourism. In order to preserve health, to maintain social relationships, to be successful in the professional life/work, people often leave their usual place of living, so travelling contributes to life satisfaction. According to the results of the research led by ÁGNES UTASI (2006), more elements of the subjective well-being, as one of the attributes of quality

⁶ <http://worlddatabaseofhappiness.eur.nl> Download: 8 March 2008.

life, can be linked to tourism. Although individual surveys do not highlight the role of travelling in forming social and transcendent relations, according to the program's hypotheses, travelling has a significant role in developing safety satisfaction factors like familiar relationships, public life or religion.

Approaching from the point of view of the bibliography analysing subjective QoL, well-being materialised in travelling can be observed both in the activity itself, so in the satisfaction of the motivation and in the everyday life's influence (PERDUE, R. *et al.* 1999; JUROWSKI, C.–BROWN, D. 2001; GILBERT, D.–ABDULLAH, J. 2002). For most of the travellers, tourism is a useful and pleasant activity as it generates agreeable episodes of leisure time spending. Travelling is good. Considering that travelling has a motivation, and that the traveller prepares the trip himself or with the help of a professional travel organizer, tourism is mostly a successful activity. So, besides getting away from the everyday environment, self-justification, pleasure generated by the satisfaction of needs, tourism mobility also includes the usefulness, as travelling proceeds have their benefits in everyday life (e.g. education/new knowledge, new relationships, physical relaxation etc.).

The measurement of subjective quality of life is one of the most difficult areas of social sciences (BABBIE, E. 1999). The commission of the political sphere motivates researchers to 'bomb' the society with surveys using different scales of satisfaction, in spite of acknowledging the methodological difficulties of the topic (FERRERI-CARBONELL, A.–FRIJTERS, P. 2004; GEBAUER GY. 2007). Meanwhile some professionals intend to approach subjective QoL by so called substitute (proxy) indicators, most of the academics agree that one cannot judge one's well-being based on an outsider's observation (HEGEDŰS, R. 2001; SZABÓ, L. 2003). Participation in tourism is a typical example for the acknowledgement of a gap in using a substitute indicator. Namely, travelling to a funeral of a relative living in the countryside does not increase quality of life, so the number of trips taken cannot lead to conclusions about one's well-being. Even though there are researchers who question the feasibility of the measurement of happiness (GRIFFIN, J. 2007), it does have a place among social indicators if the monitoring of the subjective QoL presumes the norms, takes into account the temporal comparability, and includes substantive questions (LENGYEL, L. 2002).

Compared with general happiness research, the studies aimed at the correlation between tourism and subjective QoL have not enriched much the bibliography about the methodology. In most cases, attitudes toward travelling, correlation between tourism activities and satisfaction and monitoring of tourism's effect to one's life are in the focus of analysis about tourism mobility and happiness (POMFRET, G. 2006; ANDERECK, K. *et al.* 2007). And, in none of the studies has been included a survey representative to the population of a country.

Role of Hungarian population's travelling in happiness generation

Participation of the Hungarian population in tourism

Travelling is part of leisure time culture of the Hungarian population, tourism can be defined as part of the life both among people grown-up/socialised in the Kádár-system/socialism and among the generation following them (CZEGLÉDI, J. 1982; LENGYEL, L. 1988, 2004). Commissioned by the Hungarian National Tourist Office, the research group in M.Á.S.T. (Market and Public Opinion Poll Company) has been carrying out survey about the travelling habits of the Hungarian population as of 2003. Using the same methodology since then, it enables comparison between time-series, and the 1,000 persons sample is representative to the adult (18+ years old) Hungarian population by place of residence, gender and age. According to the research results, the Hungarian population actively participates both in domestic and outbound tourism. Between 2003 and 2006, 61–72% of the households had taken a one-day trip, meanwhile 61–62% was the share of households taking an overnight trip. Reasons for non-travelling are mainly economic situation, health concerns and lack of time (M.Á.S.T. 2007). The tourism motivation, and the activities generated by it come to life in relaxation, in visiting friends and relatives and in beach/waterside tourism, namely they appear on the physiological level and on the level of social relations of the hierarchy by MASLOW, A. As the satisfaction of the basic and the growing needs also play a role in life satisfaction (MASLOW, A. 2003), getting out of the everyday environment by travelling can contribute to the increase of happiness of the Hungarian population. This leads to the conclusion that people who travel are happier than non-travellers.

Methodology

In line with the National Tourism Development Strategy (2005–2013) and in order to fulfil the policy's requirements regarding quality of life, the Tourism Unit of Ministry of Local Government and Regional Development (now Ministry of Local Government), together with the Hungarian National Tourist Office and the Geographical Research Institute Hungarian Academy of Sciences defined the issues seeking the primary correlation between tourism and life satisfaction⁷. After consulting the international and available in Hungary literature, three themes had been highlighted: firstly general life satisfaction,

⁷ Parallel, the Tourism Unit of the Ministry of Local Government began to develop the Tourism-specific Life Satisfaction Index (in Hungarian TÉMI). In order to monitor the theoretical frameworks and to develop the methodology, it has commissioned the preparation of an internationally pioneer study to a consortium led by company Xellum Ltd.

secondly the role of travelling in happiness generation, thirdly tourism as an activity influencing economic, social and natural environment. The questions defined by the expert team were included in the survey about the travelling habits of the Hungarian population conducted by the Hungarian Central Statistical Office. The results of the survey conducted in 11,500 households in 2007 are representative to the Hungarian adult (18+) population. In this paper, the general life satisfaction and the symbiosis of travelling is analysed by household's size, age, education, income level and participation in tourism/number of trips taken.

Results

Travelling as a factor of happiness

The analysis of the Hungarian population's life satisfaction shows a general average of a more positive than unconcerned state of 3.32 (1 to 5 scale where 1 is not happy at all, 5 is very happy) (*Table 1*). Happiness is influenced significantly by age, education, income level, and participation in tourism, meanwhile household's size has a limited effect.

The bigger the household is, the happier is the individual. The happiness value is 2.88 in single households, 3.50 in households with 4 persons, meanwhile in households with 5 or more persons, the happiness value is somehow lower (3.47). The value of life satisfaction shows a significant decrease with the age of the respondent. Meanwhile happiness value is 3.67 among the 18–24 years old, the same value is 2.89 among 65+ years old people. Also education has an important role in life satisfaction. Respondents without primary education are much less happier (2.84) than people with a degree (3.86). Polarization regarding income level shows the biggest difference in happiness value. Meanwhile people who consider their income level very low have a happiness value of 2.80, people in the highest income category have a value of 3.93 (Hungarian population proves the controversial axiom that money does not make happy, as money has proved to be of primary importance in the evaluation of life satisfaction). Also travelling contributes to life satisfaction. The more trips are taken, the happier is the individual. Those who did not take any trip in 2007, enjoy a happiness value of 3.05, meanwhile the same ratio is 3.73 among those who had taken at least 4 trips during the period in concern.

Although the Hungarian population is actively involved both in domestic and outbound tourism, the interviewees rated the importance of travelling in their own life at 2.53 on average (1 to 5 scale where 1 = no role at all, 5 = very important role) (*Table 1*). Thus a conclusion could be drawn that tourism mobility does not play an especially important part in the value hierarchy of

Table 1. Image of happiness among the Hungarian population, 2007 (n=11,500)

Factor	Life satisfaction*	Role of travelling in satisfaction**	Role of travelling in life***
Household's size			
1 Person	2.85	3.14	2.07
2 Persons	3.22	3.38	2.41
3 Persons	3.42	3.55	2.66
4 Persons	3.50	3.69	2.82
5+ Persons	3.47	3.49	2.48
Age			
18–24	3.67	3.86	2.99
25–44	3.55	3.66	2.79
45–64	3.20	3.41	2.48
65+	2.89	3.01	1.87
Education			
No education	2.84	2.94	1.70
Primary	3.02	3.21	2.05
Secondary	3.43	3.58	2.68
Degree	3.68	3.78	3.15
Income level			
Very low	2.80	3.16	1.88
Low	3.14	3.34	2.23
Average	3.50	3.60	2.79
High	3.79	3.79	3.28
Very high	3.93	3.85	3.63
Number of trips			
No trip	3.05	3.20	1.91
1–3 trips	3.58	3.73	3.14
4+ trips	3.73	3.88	3.41
Total	3.32	3.47	2.53

* Question: Generally, how happy do you consider yourself?

** Question: In your opinion, how does travelling influence one's happiness when one can afford to travel freely?

*** Question: What role does travelling play in your life?

Source: HCSO

the Hungarian society. At the same time the household's size, age, education, income level, and the participation in tourism are relevant factors when talking about the importance of tourism mobility.

The larger the household is, the more important is the role of travelling, but comparing households with 4 persons (2.82) with bigger (5+) households we can see a drop in this value (2.48). In line with ageing, travelling is dedicated less importance: meanwhile among the 18–24 years old respondents the value is 2.99, 65+ years old respondents rate the importance of travelling at 1.87 on an average. Also higher education seems to allow for the increased importance of travelling, whereas the least educated people show a much lower rate (1.70)

than the average. Also the evaluation of income level increases parallel with the importance of travelling. Interviewees with the lowest income gave a rate of 1.88 on an average, meanwhile among those with the highest income the same ratio is 3.63, namely the latter group assigns maximum importance to tourism. Those who had taken no trips during the studied period, are also aware of the importance of tourism mobility, their average rate of 1.91 is based on the previous travelling experience. Naturally, tourism mobility was appreciated much higher (3.41) by those interviewees who had taken 4 or more trips.

The Hungarian population bears witness to the closer relationship between tourism mobility and life satisfaction when thinking about travelling as a source of happiness (*Table 1*). The adult population gives a higher rate for travelling as a source of happiness (3.47) than for life satisfaction in general (3.32). Taking into account the demographic factors, only respondents with high or very high income level show a similar or a somewhat lower (-0.08) rate of travelling as a source of happiness than general life satisfaction. The maximum positive anomaly was registered among the respondents with very low income (+0.36), the single households (+0.29) and among the 45–64 years old interviewees (+0.21). With regard to the effect of travelling on happiness, the household's size, education, income level and tourism mobility shows a parallel ratio, meanwhile the age is in inverse ratio to it. For the households with 1 to 4 persons, the importance of tourism mobility as a source of happiness is in line with the education, income level and participation in tourism in 2007 (in the case of households with 5 or more persons, the evaluation of travelling as a source of happiness is lower than in the smaller ones). The older the respondent is, the lower is the importance of travelling as a source of happiness. In this respect the youngest respondents gave the highest rates, whereas the oldest interviewees assigned the lowest rates.

Travelling as a factor of value hierarchy

The expenditure structure of the households highlights the qualitative and quantitative dimensions of need satisfaction. The realized expenditure is not in correlation with the evaluation of the importance of the given need, as the income level of the households is also influenced by different circumstances, that are difficult to define (e.g. illness, heritage), besides the classical income and expenditure factors like education, age, place of residence etc. So, when examining life satisfaction, it is much more approved to focus on the image of needs, rather than the volume of the expenditure on their satisfaction.

The Hungarian society's satisfaction based on Gárdonyi's 'we are poor, but we are alive' philosophy dates back to the 'fridge socialism' in Kádár's Hungary (LENGYEL, L. 1988., 2004., 1988). The conversion to capitalism and the

emerging consumer society after the transition in 1989 resulted in electronic equipment, cultural goods, travelling abroad, but also health and prevention services topping the value hierarchy of the Hungarian population. Besides the decreasing consumer structure of the impoverished social stratification, the diversification of material factors influencing life satisfaction can be observed until today.

Regarding the factors included in the study, health and prevention is at the top of the value hierarchy of the Hungarian adult population (Table 2). It is followed by the housing/home, and the electronic devices. On a scale of 1 to 5 (where 1 = not important at all, and 5 = very important) health and prevention has an importance of 3.82, meanwhile buying new/changing car is the least important (2.24) for the respondents. Travelling is not among the essential values in the life of the Hungarian population. Domestic trip (3.03) is well behind health and prevention (3.82), housing/home (3.56) and electronic equipment (3.28). Travelling abroad (2.42) is even less important than clothing (2.93) or cultural activities (2.67).

Table 2. Importance of selected material goods in the life of Hungarian population, 2007 (n=11,500)

Factor/Goods	Domestic trip	Outbound trip	Health, prevention	Cultural activity (cinema, theater, exhibition etc.)	Housing/home	Electronic equipment	Clothing	Buying new/ changing car
Education								
No education	2.10	1.52	3.60	1.76	2.87	2.46	2.24	1.44
Primary	2.49	1.89	3.66	2.09	3.26	2.99	2.63	1.85
Secondary	3.23	2.57	3.86	2.84	3.71	3.46	3.10	2.43
Degree	3.65	3.20	4.06	3.46	3.82	3.48	3.16	2.61
Income Level								
Very low	2.40	1.79	3.62	2.04	3.25	2.96	2.73	1.75
Low	2.74	2.12	3.77	2.38	3.41	3.09	2.71	1.95
Average	3.31	2.67	3.88	2.93	3.72	3.47	3.09	2.50
High	3.61	3.32	4.05	3.35	3.77	3.57	3.30	2.80
Very high	3.76	3.50	3.62	3.44	4.06	3.85	3.20	2.99
Total	3.03	2.42	3.82	2.67	3.56	3.28	2.93	2.24

Source: HCSO

As the study has a focus on tourism, the factors are highlighted where domestic and outbound trips showed the maximum value difference between the attributes. The importance of domestic trip is influenced mostly by the education. For the domestic trips, average rates by respondents without any

education (2.10) and by respondents with a degree (3.65) showed a much bigger difference than regarding household's size, age or income level. The same is in the case of the outbound trips where income level generates the biggest difference in the value. Meanwhile respondents with a very low income gave a value of 1.79 for the importance of outbound trips the same ratio is 3.50 among the respondents with a very high income. For people with secondary education or a degree as well as for people with high or very high income, domestic and outbound trips are of greater importance than the average.

2.3.3. Travelling as a functional activity

With the fact taken for granted that travelling has a vital role in the satisfaction of human needs, trips with different motivations can influence life satisfaction. For example, having a disease healed during a trip, fulfillment of dreams and wishes outside of the daily environment, meeting/visiting friends and relatives, or a simple physical, spiritual or mental refreshment can contribute to the increase of subjective quality of life.

Tourism mobility of the Hungarian adult population is mostly dominated by visiting friends and relatives, i.e. maintaining human relationships (Table 3). On a scale of 1 to 5 (where 1 = not important at all, 5 = very important), relations with friends and relatives living far away has an importance of 3.84. This is followed by the regeneration, i.e. recreation of one's working capacity (3.68). As travelling is also a joyful activity, a lot of respondents are keen to re-experience it over and over; they travel for the sake of enjoyment. This function of tourism mobility is much more valued (3.44) than health and prevention (2.83). Generally speaking, travelling has the least importance in relation to success feeling of the individual (2.67).

When the attributes with the different functions of travelling are analysed with regard to the role and importance of tourism mobility, it is household's size and age that mainly influence the health and prevention functions of taking a trip. Education is an important determining factor in relation to the regeneration function meanwhile income level has a significant role at re-experiencing travelling or taking another trip. The number of trips strengthens the relationships with friends and relatives resulting in an increasing difference between the attributes. Health and prevention mark the biggest difference (+0.33) in the case of households with two (3.00) and five or more (2.67) persons. Regarding the age of the respondents, also health and prevention differentiate the most: meanwhile 18–24 years old respondents value it 2.31, the same ratio is 3.15 among 65+ year old respondents which shows a difference of +0.84. Education has an outstanding role regarding relaxation, regeneration as the difference between respondents without education (2.91)

Table 3. Functions of Travelling among the Hungarian Population, 2007 (n=11,500)

Factor	Health, prevention	Success feeling	Re- experience of travelling	Human relations	Regenera- tion
Household's size					
1 Person	2.99	2.73	3.38	3.75	3.53
2 Persons	3.00	2.63	3.38	3.79	3.56
3 Persons	2.78	2.69	3.43	3.88	3.74
4 Persons	2.74	2.72	3.52	3.90	3.83
5+ Persons	2.67	2.59	3.42	3.83	3.61
Age					
18–24	2.31	2.65	3.67	3.79	3.65
25–44	2.74	2.74	3.53	3.91	3.85
45–64	3.05	2.69	3.38	3.83	3.66
65+	3.15	2.39	3.02	3.71	3.19
Education					
No education	2.75	2.32	3.08	3.79	2.91
Primary	2.62	2.43	3.13	3.71	3.36
Secondary	2.85	2.70	3.48	3.85	3.74
Degree	3.03	2.89	3.70	3.98	3.94
Income level					
Very low	2.60	2.42	3.05	3.73	3.33
Low	2.76	2.55	3.31	3.77	3.52
Average	2.86	2.71	3.52	3.89	3.76
High	3.07	2.98	3.66	3.83	3.99
Very high	2.90	3.03	3.94	4.13	3.91
Number of trips					
No trip	2.61	2.52	3.10	3.52	3.36
1–3 trips	2.93	2.70	3.57	3.93	3.86
4+ trips	3.02	2.86	3.75	4.21	3.86
Total	2.83	2.67	3.44	3.84	3.68

Source: HCSO

and ones with a degree (3.94) is +1.03. Income level determines the tourism mobility, namely repeated travelling is valued much more by respondents with high income (3.94) than by interviewees with a very low income (3.05) which means a difference of +0.89. The number of trips has the most influence with regard to the relationship with friends and relatives, respondents who had taken no trips in 2007 has a value of 3.52 which is much lower (+0.69) than the value among the respondents taking 4 or more trips (4.21).

Analysing the attributes from the reverse aspect, the importance of travelling shows similar results as stated above. Health and prevention is the least valued/determining function among the 18–24 years old (3.07) cohort and it is valued the highest among respondents with a high income (3.07).

Success is the least important for interviewed with no education (2.32) and the most important for respondents with a high income (3.03). Re-travelling has the smallest role among 65+ years old, meanwhile the biggest role among individuals with very high income (3.94). Maintaining the relationship with relatives, the biggest difference can be seen between respondents taking no trip in 2007 (3.52) and the ones taking 4 or more trips (4.21). The regeneration function of travelling shows the biggest gap between respondents without education (2.91) and respondents with a high income (3.94).

3. Conclusions

Thinking about happiness dates back to Aristotle's times, but its wider interpretation has been assisted and shaped by recent social-economic changes. The rise of living standards, an easy availability of goods and services, and the growing freedom motivate politicians to initiate the development of intelligence concerning research inquiring about happiness. Accepting VEENHOVEN'S hypothesis, according to which happiness is the reflection of life satisfaction and the materialisation of subjective quality of life, more attention is paid to the exploration of the characteristic features of happiness, and to the way how to reach it. Because of the transdisciplinary character of happiness studies and due to the complexity of life, the spectrum of such studies increases continuously. And so, also tourism as one of the most dynamically developing leisure sector plays an ever more important role in the studies on happiness.

In Hungary, research activities aimed at the correlation between tourism and the subjective QoL has begun in line with the realisation of the National Tourism Development Strategy (2005–2013). The main outcomes of the basic research which is representative to the Hungarian adult population can be summarized in the followings.

Tourism mobility contributes to life satisfaction, as travellers have proven to be happier than non-travellers. Among the factors defining tourism demand, this is mostly on a par with the role of personal incomes being discretionary in increasing happiness. The higher the individual's income is, the happier he/she is. Since discretionary income is a basic condition for travelling, richer people travel more frequently what makes them happier.

Although two thirds of the Hungarian households participate in tourism, travelling does not have a key role in life. It has been found that younger, more educated people and persons with a higher income devote more attention to travelling/the role of tourism. This is mainly explained by the extensive types of motivation, and by the more successful socialisation.

Even if travelling does not play a determining role in the life of the Hungarian population, defining it as a factor of happiness results in a value

above the average satisfaction level. Only respondents with high and with very high income valued tourism as factor of happiness at an average rate or at a rate lower than that. Hungarian adults who are satisfied with their tourism mobility think that travelling can make them happier, meanwhile completion itself highlights that travelling is not the key for happiness.

Travelling cannot be defined as one of the most important issues in life. Similarly to other Hungarian and international studies, health and prevention is in the focus when talking about most important things in life (this fact shows a confidence in developing health tourism). The fact that domestic tourism is valued more than travelling abroad, can be explained by the financial limitations of the population.

Travelling primarily serves maintaining and strengthening social relations. Taking into account that studies on the travelling habits of the Hungarian population as a rule qualify visiting friend and relatives (VFR) among the most important motivation, it is not surprising that making relationship with friends and relatives closer also defines the function of tourism mobility. Meanwhile health is the most important in life, this is not reflected when the function of tourism is discussed. Probably the high price level of health and wellness tourism keeps back the population from the more active participation in health tourism. From the viewpoint of the development of Hungarian tourism a very positive sign is that the population have recognised the experience of re-travelling. So probably an increasing number of people intend to participate in domestic and outbound tourism.

The first phase of the research programme aimed at the exploration of the symbiosis between tourism and the subjective quality of life has confirmed the need for more detailed studies. In the next phase of the project the impacts of the concrete trips and tours upon the life of the inhabitants are planned to be explored.

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LITERATURE

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Károly Kocsis–Zsolt Bottlik: Ethnic map of the present territory of Hungary, 1941. Ethnic map of Hungary, 2001. Hungarian Academy of Sciences, Geographical Research Institute. Budapest, 2009.

The geographical workshop of the Hungarian Academy of Sciences (GRI HAS) launched a series of maps in the mid-1990s, which show the present ethnic structure of the regions in the Carpathian Basin with sizeable Hungarian population and the change of this pattern during the past five hundred years. This publication series is a milestone in the history of Hungarian ethnic geographical research and now the latest (eighth and ninth) pieces of this series are available for those interested in the ethnic situation within the Carpathian Basin.

Author of the series is Károly Kocsis who has a quarter century long academic experience, and who revived the ethnic geographical studies having flourished between the world wars but vanished afterwards. Reports on the lot of ethnic minorities in the region and on changes in their socio-economic position and demography pattern were held back during the years of communism but today they are back in the focus of the general interest again. Representatives of social sciences and geography, together with the politicians and the public are equally concerned about the issue. Károly Kocsis has analysed the ethnic situation of the Carpatho-Balkan region in several of his previous works. These writings laid the foundations of a reviving discipline at the turn of the millennium. His present co-author Zsolt BOTTLIK (Eötvös Loránd University, Department of Geography) also is an expert in the spatial pattern of the ethnicities in the region.

The layout of the previous map sheets which showed the area of the Carpathian Basin beyond the Hungarian state borders were similar to that of the actual work representing the ethnic situation of our country. The series deploys a multitemporal approach: it successfully presents the dynamics in changes of ethnic structure during the last five hundred years despite the constraints imposed by cartographic representation.

The recent publication is different from the previous ones in a way that it consists of two sheets of double pages. This innovation accounts for the shape of the country and claims to prepare maps at a scale which are suitable to depict the ethnic pattern by settlements. On the front pages there are maps of Hungary (1:500 000) showing the composition of the settlements' population at the moment of the censuses held in 1941 (by mother tongue) and 2001 (by ethnicity).

The supplementary maps on the reverse show the changing spatial ethnic structure since the late 15th century. The cartographic representation is complemented with a table and a detailed explanation in Hungarian and English. The sources of data which comprise the basis of these maps are the official censuses from 1880 only, as the reconstruction of ethnic structures for the previous periods is rather ambiguous. The emerging distortions are reduced by the application of varied sources for the estimations (mainly historical monographs and gazetteers).

The maps on the front pages are adjusted to recent administrative divisions while the supplementary maps on the back side show the ethnicities ever lived within the contemporary administrative area of the settlements. The settlement names indicated on the front page cover the territory of the country completely therefore inscriptions of all settlements figure in the maps those having been official at the two time slices.. In case the number of inhabitants qualifies for it, the names can be read in the language of ethnic minorities as well. Because of size limits, only the name of major settlements appear in maps of the reverse side. For these supplementary maps, the reference periods are indicated.

In the maps on the front, due to the detailed data of censuses, the ethnic composition by settlements was represented with pie charts. The size of diagrams of settlements are proportional to the numbers of inhabitants having importance, especially in case of the 2001 census where the map provides information in an almost entirely homogeneous space.

The maps of Hungary showing the spatial pattern of ethnic minorities during the previous centuries are made through areal representation. Owing to the uncertain sources of data and smaller scale, however, in this case only the (absolute or relative) ethnic majority of settlements were indicated with patches of different colours. These supplementary maps are aimed to introduce the macro-level changes which are feasible to be shown by this method of mapping. The distortion caused by the areal representation is partly counterbalanced by the delineation of uninhabited territories.

The table is also a clear introduction into the dynamics of multitemporal changes as the comparison of national data sets makes possible research aimed at the analysis of the changes in the number of people that belong to ethnic groups and their proportions compared to the entire population.

The explanatory notes furnishing the map user with comments to the figures explore the social processes behind the changes in ethnic structure in detail, supported by a rich bibliography. The periods described are not derived from periods defined by the represented dates; they are confined to the distinct eras of Hungarian history instead. Thus the interpretation of processes is made much more easier. The maps support the message of this summary which is based on the crucial turning points of the history of ethnic groups in the Carpathian Basin, hence the changing ethnic aspect is also introduced and it is not only the maps which get an in-depth analysis.

The publication is a correct piece of work in mapping performed by the cartographers of the Geographical Research Institute. This is the reason why the graphical representation is so attractive: the colours, symbols and methods make aesthetic experience and illustrate correctly the ethnic structure of our country and the changes that have occurred in it.

The ethnic maps of Hungary stands its ground alone without the other maps of the series. The presentation of the spatial aspects of processes of historical scale is the real value of this long awaited publication. It is one of the essential bases for a research of social processes in the field of various social sciences. It can be used as an auxiliary material in public education and in higher education equally, and also may serve as a source of information for the interested layman.

MARGIT KŐSZEGI

OECD Environmental Outlook to 2030. Organisation for Economic Co-operation and Development, 2008, Paris, 517 p.

The *OECD Environmental Outlook to 2030* provides analyses of economic and environmental trends to 2030, and simulations of policy actions to address the key future challenges.

The focus of this *Environmental Outlook* is expanded from the first Outlook published in 2001 to reflect developments in both OECD countries and Brazil, Russia, India, Indonesia, China, South Africa (BRIICS), and how they might better co-operate on global, regional and local environmental problem-solving.

The *OECD Environmental Outlook to 2030* is based on projections of economic and environmental trends to 2030. The key environmental challenges for the future are presented according to a „traffic light“ system. The *Outlook* also presents simulation of policy actions to address the key challenges, including their potential environmental, economic and social impacts.

The *Outlook* highlights some of the „red light“ issues that need to be addressed urgently. The policy scenarios in this *Outlook* indicate that the policies and technologies needed to address the challenges are available and affordable. Ambitious policy actions to protect the environment can increase the efficiency of the economy and reduce health-related costs as well. In the long run, the benefits of early action on many environmental challenges are likely to outweigh the costs.

If no new policy actions are taken within the next few decades, humankind risk will irreversibly alter the environmental basis for sustained economic prosperity. To avoid that, urgent actions are needed to address in particular the „red light“ issues such as climate change, biodiversity, soil degradation and loss, water scarcity and health impacts of pollution and hazardous chemicals. Without further policies, for example: global emissions of greenhouse gases are projected to grow by a further 37% by 2030, and by 52% to 2050. This could result in an increase in global temperature over pre-industrial levels in the range of 1.7–2.4°C by 2050, leading to increased heat waves, droughts, storms and floods, resulting in severe damage to key infrastructure and agricultural production.

A considerable number of today's known animal and plant species are likely to be extinct, largely due to expanding infrastructure and agriculture, as well as climate change. Food and biofuel production together will require a 10% increase in farmland worldwide with a further loss of wildlife habitat. Continued loss of biodiversity is likely to limit the Earth's capacity to provide the valuable ecosystem services that support economic development and human well-being.

Water scarcity will worsen due to unsustainable resource use and management as well as climate change; the number of people living in areas affected by severe water stress is expected to increase by another 1 billion to over 3.9 billion.

Health impacts of air pollution will increase worldwide, with the number of premature deaths linked to ground-level ozone quadrupling and those linked to particulate matter more than doubling. Chemical production volumes in non-OECD countries are rapidly increasing, and there is insufficient information to fully assess the risks of chemicals in the environment and in product chain.

The greatest environmental impacts will be experienced by developing countries, which are less prepared to manage and adapt. But the economic and social costs of policy inaction or delaying action in these areas are significant and are already affecting economies – including in OECD countries – directly (e.g. through public health care costs) as well as

indirectly (e.g. through reduced labour productivity). The costs of policy inaction for biodiversity loss (e.g. fish stocks) and climate change could be significant.

There is a window of opportunity now to introduce ambitious policy changes to tackle the key environmental problems and promote sustainable development. Investment choices being made today need to be directed towards a better environmental future, particularly those that will lock-in energy modes, transport infrastructure and building stocks for decades to come. Based on the long-term analytical experience of the OECD the following conclusions can be drawn:

- Better use a mix of complementary policies to tackle the most challenging and complex environmental problems, with a strong emphasis on market-based instruments („Polluter Pays Principle”), such as taxes and tradable permits.

- Priorities action in the key sectors driving environmental degradation: energy, transport, agriculture and fisheries. Environmental administrations cannot solve this alone. Environmental concerns need to be integrated into all policy-making by relevant authorities including finance, economy, energy, transport, agriculture, tourism and trade, and reflected in all production and consumption decisions.

- Ensure that globalisation can lead to more efficient use of resources and the development and dissemination of eco-innovation. Business and industries need to play a lead role, but governments must provide clear and consistent long-term policy frameworks to encourage eco-innovation and to safeguard environmental and social goals.

- Improve co-operation between OECD and non-OECD countries to address global environmental challenges. Brazil, Russia, India, Indonesia, China and South Africa (BRIICS) in particular are key partners given their growing influence in the world economy and increasing share of global environmental pressures. Further environmental co-operation between OECD and non-OECD countries can help spread knowledge and best available technologies and practices.

The *OECD Environmental Outlook to 2030* with its very rich analytical background provides policy-makers and researchers with guidance how to address more complex and long-term global environmental challenges and to enhance forward-looking, preventive and efficient environmental policies.

ISTVÁN POMÁZI

Academician György Enyedi receives *Laureat d'Honneur* award



Achievements of Hungarian geographical science received an exclusive appreciation on the 31st Congress of the International Geographical Union (IGU) held in Tunis between August 12 and 15, 2008. *Laureat d'Honneur*, the highest recognition by the IGU was presented to Professor György ENYEDI, former Vice-President of the IGU at the closing session. It should be considered a great honour for the Hungarian scientist, because from East and Central Europe only three prominent geographers – I.P. GERASIMOV (Russia), J. KOSTROWICKI and S. LESZCZYCKI (Poland) – were hitherto honoured with this award. During the ceremony two other outstanding representatives of the discipline – V.M. KOTLJAKOV (Russia) and L.A. KOSINSKI (Canada, former president of the IGU) – were conferred the same distinction.

Words of appreciation of György ENYEDI'S oeuvre and his high international merits in the field of geography were voiced by Ronald F. ABLER, President of the IGU as follows.

“For decades, Prof. György ENYEDI has been the voice and the face of Hungarian geography in the worldwide community of geographers. This position was built first and foremost on the quality of his own work, but also on his skills at team building. Secondly, because of his untiring efforts at maintaining international academic contacts, he has brought many colleagues from abroad in contact with their Hungarian counterparts and this cross-pollination has born rich fruit. During his long and distinguished career, he thus made a major contribution to the international standing of Hungarian geography.

He built contacts with many groups across the world, using his positions in Hungarian Academy very effectively to disseminate knowledge and insights at a global scale. At the individual level also, he has, directly and indirectly, stimulated many people to make, maintain and expand contacts and to share its benefits with others. Both as a person

and as a mentor, he has touched the professional lives of numerous colleagues across the world of geography.

György ENYEDI is a decisive figure in the long-term development of regional science as an independent and integrative discipline. He has been equally impressive in his leadership capacity within science internationally. Vice-President of the International Geographical Union (1984-1992), he served as President of the Hungarian committee of UNESCO (1998-2002). He is a member of Academia Europaea as well as an honorary member of seven foreign geographical societies. He is Chief Editor of the journal *Hungarian Science* and still serves on the editorial board of several international journals. He was visiting scholar in various leading US and French universities and has received several Hungarian and international awards and honors.

Professor ENYEDI, you have made gigantic contributions to the discipline of geography and have championed its identity among a broad range of other sciences. Please accept this Laureat d'Honneur 2008 as the deserved recognition by the International Geographical Union of your numerous outstanding achievements."

Hungarian geographers are proud of the special privilege and congratulate Academician ENYEDI on this occasion.

TIBOR TINER

In memoriam Academician Sándor Marosi



On 5th July 2009 the Hungarian and international geographical community lost one of its prominent personalities. Professor Sándor MAROSI, a highly rated researcher of the first generation of physical geographers after World War II, member of the Hungarian Academy of Sciences (HAS) passed away in 81st year of his life. He was laid to eternal rest beside his beloved wife, who died ten years before. The Lutheran funeral service in the New Public Cemetery in Budapest on 23 July was attended by the family members, and also by illustrious representatives of the national community of geosciences, well-known personalities of the Hungarian Academy of Sciences (HAS), national institutions of learning, including universities, professional and social organizations and a large company of friends.

Farewell speeches were held by professors Ferenc SCHWEITZER, director of the Geographical Research Institute of HAS, Árpád PAPP-VÁRY, president of the Hungarian Geographical Society and Szabolcs LEÉL-ÖSSY, president of the Hungarian Society for Karst and Speleological Research.

MAROSI came from a poor and big family living in a large village on the Danube–Tisza Interfluve, the heart region of Hungary. He was born on 16 May 1929 in Soltvadkert where he spent his childhood. In 1947 he passed final examination in Szilády Áron Reformed Secondary Grammar School in Kiskunhalas and in the same year he was admitted to Pázmány Péter University in Budapest where he received his diploma in 1952 as a teacher of geography and history. Simultaneously he also studied geology. He was a disciple of famous tutors in geography (Béla BULLA, Andor KÉZ, Sándor LÁNG), geology and of the paleontologist of world renown Miklós KRETZOI who all influenced his early development of a researcher.

Thanks to his talent and diligence Sándor MAROSI was involved into research work as a student in the field of hydrogeological mapping in sample areas of Great Hungarian Plain (Alföld). Later his attention was drawn primarily by physical geography, geology, geomorphology and landscape mapping where he achieved his first results in academic research.

Between 1948 and 1951 several scientific research institutions have been reorganised or established by the Ministry of Religious Affairs and Education in Hungary. Among them a Geographical Library and Map Archive started its activity in close co-operation with the Institute of Geography of the University and with the Institute of History. Later it was renamed into Geographical Research Group and became incorporated into the Hungarian Academy of Sciences (HAS), and in 1967 reorganised into the Geographical Research Institute (GRI) of HAS.

Between 1951 and 1954 the research group was headed by Ferenc KOCH. Among the founders of Research Group was Sándor MAROSI whose scientific career started from that time. He has been a research worker from the very start and first acted as scientific secretary of the institute (1968–1972), later he worked as deputy director (1973–1993) and

the right hand of Professor Márton Pécsi, director of the Institute between 1967 and 1990. In 1993 professor MAROSI was elected a corresponding member of the HAS, and in 2001 he became its regular member. He was also one of the founders and first editor of *Földrajzi Értesítő* (Geographical Bulletin), the official scientific periodical of the institute since 1952. From 1972 until 2002 he held the position of editor-in-chief of the journal.

His research activity in the field of landscape geography started in the 1950s in the Mezőföld region (East Transdanubia) and proceeded with studies on the southern shoreline of Lake Balaton. Published with László ÁDÁM and Jenő SZILÁRD *The physical Geography of the Mezőföld* presented a detailed geological and geomorphological survey about the region investigated. He and his colleagues were pioneers in geomorphological mapping based on geological investigations in Hungary. From the early 1960s Sándor MAROSI studied the origin and formation of derasional valleys with different genesis, then his attention turned towards Inner Somogy region (part of Transdanubian Hills), its geomorphic evolution and morphological features.

Still in the early 1960's, together with Pál JAKUCS, he conducted detailed ecological and geocological typological studies completed by micro- and topoclimatic measurements, botanic and pedological surveys. All these gave an impetus to complex geocological investigations. From the end of this decade several dozens of type localities had been selected to carry out detailed agroecological survey and mapping (at 1:2,000 through 1:10,000 scales) which resulted in series of thematic maps furnished by explanatory notes.

The working out the methodology of landscape analysis and evaluation elaborated together with Jenő SZILÁRD was a milestone in his oeuvre during the 1970s. It was a remarkable trend, followed by the relief analysis and complex evaluation of environment which involved the assessment of the environmental components by value ranking. As a result a remarkable contribution (*Landscape and Environment*) had been published in Geographical Bulletin (1981) where the most important aspects of the topic have been summarized.

The evaluation of individual environmental (landscape) components or the assessment of their suitability for various purposes can be integrated into a complex landscape synthesis. The survey and evaluation of landscape potential as a summary of favourable or unfavourable nature endowments for cultivation was rendered as task and subject of the trend of landscape evaluation on the basis of the physical geographical factors. From this definition of landscape evaluation (expressed by MAROSI) it follows its being not merely a new trend within physical geography but a discipline within applied geography. Thus, an economically and socially oriented and also ecologically centred landscape analysis and synthesis evolved in Hungary which contributed to the German school of landscape ecology as early as in the beginning of the 1960's. Extending the notion 'ecotop' taken from landscape ecology to label a homogeneous territorial unit, it was suggested by MAROSI to introduce 'ecopottyp' (an acronym for 'ecological potential type').

In the spirit of this academic school a number of monograph series were published and also studies on macro-, meso and microregions released. MAROSI played a leading role in this process. Under his editorship six volumes of a series entitled *Landscapes of Hungary* were issued. Geological conditions, paleogeography, mineral resources were presented, geomorphic evolution and relief pattern, climate, drainage, natural vegetation and soil cover were tackled in close relation to each other. He was an eager member of the editorial board of *National Atlas of Hungary* (published in 1989 by Cartographia). For his outstanding editorial activities he was awarded by the Széchenyi Prize in 1990.

A considerable editorial work of the *Inventory of 230 physical microregions (micro-landscapes) of Hungary* was led by MAROSI, in co-operation with Sándor SOMOGYI. This more than 1,000 paged scientific book was published in two volumes in 1991 with the involvement of experts from outside and further authors from the Institute. The inventory focused

on the natural components of primary importance. Location, land use, relief, geological conditions, climate, natural and cultivated vegetation, soils and specific landscape properties were presented along with a summary of landscape typology and recommendations of usage. The concise descriptions are supplemented by data and quantitative parameters. The physical factors of the natural resources were treated here in a manner which allows the survey of their spatial distribution and calculation for larger areal units. This work provides an overview of systematised information for land use planning in this way promoting the consideration of natural potentials and resources in their optimal use. The data base of the inventory has created foundations for a larger data bank with options of computer storage and manipulation.

As a mapping geographer MAROSI was the member of the expert teams that created the map of natural landscape divisions of Hungary and the map of landscape types as a synthesis of landscape studies of diverse orientation and at different scales.

As a person respecting traditions and values he permanently took huge efforts to secure Hungarian geography as an element of "national sciences" against attacks from outer bodies or political sides. He was the member, and later secretary and chairman of the Geographical Scientific Committee of the HAS, the member of the National Board of Science Associations where he became the chairman of the Committee of Geography and Meteorology. His oeuvre contains nearly 30 books, 140 articles and book chapters, 25 guide books for excursions, dozens of thematic maps, and nearly hundred other publications (book reviews, chronicles etc.)

It would require a separate paper to describe his activities in the Hungarian Geographical Society, an institution he highly esteemed from 1952 to his death. He was elected president in 1993 and again in 1997. After finishing his second period in 2001 he became a honorary president of the Society. He was a regular participant of annual conferences and field trips of the Society for decades. He did his best to maintain, enlarge and develop the operation of the Society. For these achievements he won the Lajos Lóczy Award in 1982. Professor MAROSI was also the highly appreciated member of the Hungarian Geological Society and the Hungarian Society for Karst and Speleological Research. Based on the life work outlined above it should be stated that Academician Sándor MAROSI was one of the most prominent representatives of the great generation of Hungarian physical geographers and a leading personality of the domestic geography.

His memory will be saved by the Hungarian geographers.

TIBOR TINER

Joint meeting of the IAG/AIG Working Groups Human Impact on the Landscape (HILS) and Geomorphological Hazards (IAGeomhaz)

Bochum, 8–12 September, 2008

It is central in the policy of the International Association of Geomorphologists (IAG/AIG) to set up Working Groups for the study of topical issues in geomorphology. Accordingly, at the 6th International Conference on Geomorphology In Zaragoza a dozen new WGs were formed, including HILS, initiated by Dénes Lóczy, and IAGeomhaz, led by Irasema **ALCANTARA-ÁYALA**, director of the Institute of Geography at the National Autonomous University of Mexico (UNAM). There being quite significant overlaps between the research activities planned, it had been proposed that a joint meeting would serve the purposes of both Working Groups.

The event, hosted by the Ruhr University of Bochum, was an optimal occasion to overview the progress both Working Groups had made in the first two years of their existence. The 26 items of the Abstracts volume reflect a combination of mostly related anthropo-geomorphological and geohazards topics, among others, the consequences of mining, flood hazard, the triggering of mass movements. Participants came from seven countries, the remotest of them being Mexico, India and Indonesia.

Two days of paper and poster sessions were followed by discussions on future tasks, including the editing of a World Atlas of Human Impact as an end-product of the activities within the HILS Working Group. An interesting guided walk presented the history of Bochum and the German Coal Mining Museum, providing a unique opportunity to inform about the technological progress and environmental and social implications of mining activities. Two one-day field trips were organized: one to various sites in the Ruhr District and another to the open-cast lignite pits of the Cologne Bight and the Eifel Mountains.

The problems of river restoration, sewage treatment, land drainage, flood control, mine rehabilitation, derelict land re-utilization, volcanic reconstruction and many other issues were discussed with the guidance of experts in the field. A memorable social event was a dinner at a well-preserved farm in the immediate vicinity of the university.

The participants, perfectly satisfied with the program, are grateful to Dr. Stefan **HARNISCHMACHER** (now: University of Koblenz), who invested a lot of work in the successful organization of the meeting.

DÉNES LÓCZY