University of Szeged
Faculty of Economics and Business Administration

Réka PATIK

The possibilities and the analysis of the clustering of the less favoured regions: examples from the South Great Plain

PhD thesis

Consultant:
Prof. dr. Imre LENGYEL DSc.

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I. Reasons behind the theme, objectives and hypothesis of the research

The essence of clusters (directly or indirectly, mutually connected enterprises forming a geographically well-defined concentration; in other words the spatial concentration of economic activities with increasing returns) and the choice of this issue are determined by the new processes of today's economy. These processes revalue the role of space through the globalization of the past decades. Geographical distance became much more manageable with the decreased transportation costs and improved communication tools. Parallel with this, the role of the locality and space is growing: certain points of the world economy have the ability to add significant success to the economic activities otherwise quite similarly performed everywhere in the world.

Apart from this the significance of the theme chosen is definitely noticed by the international practice of less favoured economies and also by the international community of economists looking for answers for the questions raised by theoretical science. In the 1990s the focus if interest pointed to the clusters of developed countries, so the transition, less favoured and developing regions started to concentrate on clusters, too. Supporting clustering seems to be an excellent method for less favoured regions. The concept can be associated with innovation, economic development and the fight against poverty, quite understandably the attention of a broad range of international organizations (from the EU to the USAID) shifted towards clusters.

1. Clusters in less favoured regions

In most countries politicians and representatives of the less favoured regions are open to the cluster-concept, governments usually favour clustering, cluster development. It is an attractive opportunity to adapt successful methods of the developed countries. But the less favoured regions tend to have an organizational, social and economic background so different from the developed ones that it performs more poorly than expected. Latest research shows that it is worth to handle less favoured regions as a separate category when studying the opportunities of clustering.

The South Great Plain is a less favoured region, its economy can be considered as transition, semi-peripherical or neofordist. Clusters have been part of the development concepts for almost a decade now; moreover some clusters are already working in the region according to documents or might as well facts and reality. The clustering of the region has not only a theoretic significance: the EU emphasises the development of clusters among the main aims set in the Structural Funds – so the concentrations mapped in the South-Great-Plain region are very important concerning the funding and improvement of the region.

The spatial concentration of economic activities is therefore a worldwide phenomenon and not just a requisite of developed countries, despite that a large number of well-known clusters is from these economies. The less favoured regions have their own clusters, too, or there's a need for generating or developing clusters.

2. Objectives and structure of the thesis

The aim of the thesis is to examine the possibilities of clustering in less favoured regions, the unique conditions, ways and other specific features. It intends to identify what influences the beginning of the clustering, what sort of clusters can be formed, what features they have and how clustering economic activities can be recognized. The focus is on the South-Great-Plain Region as a less favoured region, certain parts of it were subject of empirical research. Its main questions were related to the clustering economic activities and the significance of the administrative borders in comparison with the cohesion of the region.

The first section is highlighting the actuality of spatial concentration and agglomeration leading to the choice of discussing this topic. There is an overview of the conceptual background as well. The second section deals with the outcome of research and experience regarding the less favoured regions. Certain part of my set of hypothesis is studied with the tools and methods described in section 3, while section 4 is dealing with the empirical research in details. The fifth section summarizes the consequences and then the thesis is completed with section 6 with the summary of the hypothesis and thoughts.

3. Theoretical background

The clarification of the use of concepts is essential due to the different interpretations of the cluster concept. The usage is determined by the choice on which theory we want to follow from amongst the concepts dealing with the spatial concentration of economic activities: economics (neoclassical or the new economic geography), regional economics or business studies. These three examine the reasons and results of spatial concentrations from different basics and focus on different areas. This thesis follows the conceptualization of regional economics. Geographical distance and organizational (cognitive) distance play a key role in these concepts. I think supporting organizations in the region are also important.

The diversity of cluster definitions inspires me to use various definitions. In a regional economics study I think it is more useful to use better defined concepts than one narrow definition, at least more useful than using broad concept including too much. The central feature is geographic proximity that is defined by the borders of the region. Although the real geographic size of various clusters can be different, the regional level seems to be adequate for examining clustering even in international comparison. I do not reject however the study of clusters appearing below this level. The organizational proximity and the social and institutional background will drive the differentiation of cluster concepts.

Cluster1 (from Imre Lengyel, 2001): geographically concentrated, interconnected sectors, enterprises and institutions, which are featured by strong social embeddedness.

Cluster2 (by Stuart Rosenfeld, 2002): geographically well-defined concentrations of mutually connected enterprises.

Cluster3 (OECD, 2004): geographical concentrations of business activities.

It is worth clarifying some concepts arising from the cluster definitions. Cooperation is the direct participation of two or more entities in product planning (design, production and marketing); it can be an interaction between two enterprises or two departments of the same enterprise. On the other hand it is a formal or informal agreement of two or more

entities on sharing information, supporting management or technical training, providing capital or market information (Polenske's cooperation and collaboration).

Geographical proximity is the physical distance of two points (economic entity, plant, organization etc.) of a NUTS-2 region. My basic theory is that geographical proximity suitable for clustering can be ensured by research within the borders of the region. But since the advantages deriving from proximity grow with growing proximity, I tend to identify local/micro clusters of nodal regions.

The density of economic transactions and the frequency of cooperation determine the organizational distance as a cognitive or social distance. It can be increased by the common labour-pool, common use of technologies etc., as they open new channels among economic entities.

Finally social embeddedness has to be mentioned, which covers the socio-cultural environment, the common values in the cluster, eventually the advantages deriving from social capital tying the entities to the region.

4. Hypotheses

The study has five hypothesis based on the objectives, goals of the research. The hypotheses are partly general or methodological (1 and 3), and partly refer to less favoured regions and the South Great Plain (2, 4 and 5).

Hypothesis 1:
Knowing the distinguishing features of a region (indifferent from the economic structure) the cluster types expected to develop can be identified.
Hypothesis 2:
In less favoured regions and in the South-Great-Plain Cluster3 concentrations are most likely to appear.
Hypothesis 3:
In less favoured regions different methodology should be applied in Cluster mapping, as other types of clusters are to be identified.

Hypothesis 4:

Nodal regions are to be examined in less favoured regions.

Hypothesis 5:

In significant nodes of the South Great Plain might develop Cluster1 or Cluster2 of high-tech activities. Besides, in other parts of the region low-tech activities might have their Cluster2s.

II. Methodology and data

In the analysis I used the results of several publications and my own empirical research as well. Through the classification of consequences documented in publications dealing with the features supporting clustering, regions of different developmental stage and SME clusters alongside with results of case-studies it was possible to create a typology of SME clusters and identify their features.

The analysis of SME clusters is explained by their exceptional role in the economy of less favoured regions. The successful global /multinational companies rarely place their core competencies or headquarters in less favoured regions. Only poorly embedded plants and subsidiaries are present, these can be the basis of clustering, cluster development. On the other hand SMEs have a bigger role in employment, which can be derived from the level of unemployment and the less favoured character of the region – so the struggle against poverty is stronger. The size structure of enterprises shows significant microentrepreneurial presence.

The key features in determining the link between the identification of SME cluster types was based on case studies – a large number of which is available. These were classified by the region's development stage, the relationship among enterprises, intensity of interactions and the activity of interacting institutions. There are clusters in developed and less favoured regions, which can be regarded as geographical concentrations without institutional support. As an example we can mention the SME clusters of Indonesia or the agri-industrial clusters of South-Italy (e.g. tomato production and processing). Being less favoured not necessarily mean to be an obstacle of successful cluster appearance. The institutional support can be a result of a spontaneous, long cultural and social process or devel-

opment programs. The Italian industrial districts and the wood-industry of Brazil can be an example, respectively.

We can find geographical concentrations in developed regions as well without intense interactions and active institutional environment. These are usually part of the "new economy" where creative and high-tech SMEs gain external economies through proximity. In Europe such examples are found in the Netherlands (multimedia cluster) or Glasgow (creative and digital media cluster). We can also mention the Danish construction industry cluster, where the modular structure of the industry does not encourage the long-term cooperation among SMEs.

As the examples for SME clusters supported by cooperations and institutions in well-developed regions the Oxford biotechnology and Grenoble IT clusters can be mentioned, moreover automotive industry clusters are classified just the same.

There is a connection between the level of development of the region and the capability of the economic activities to cluster. In less favoured regions it's mostly the traditional industries that might present well-established enterprises, even clusters. There is another "duality" between the intensity of cooperation between enterprises and institutions and among enterprises. Presumably both are based on social capital.

4. Toolkit of cluster mapping

The empirical research is based on the methodology of cluster mapping. Its elements can be found in numerous publications. Important part of the methodological overview is whether it can be used domestically (in Hungary) (Table 1).

There has not been a deep, nation-wide cluster-mapping so far in Hungary, but the incentives of clustering has been present in economic development (explicitly from the year 2000 Széchenyi Plan). As the clustering in Hungary is in an initial phase, the methods used in more developed countries tend to reach less result. The specialization of the economic entities is on a lower level. The first step of cluster development, the mapping of Hungary or the South Great Plain is not supported by the problems of the data-sources and the methodological hardbacks.

The applicableness of the methods is in connection with the theoretical background of cluster definitions (the distinction is of course not at all trivial). Moving from the theoretical economics towards business studies there are more and more features, which need to be considered in the cluster-analysis. The agglomerations of economics can be revealed with the certain types of LQ-indices or maps, some approaches of business studies however may require a correspondence analysis. There are more and more features in the methodology; the clusters of business studies can be mapped with almost any part of the toolkit.

TABLE 1: CLUSTER MAPPING TOOL-KIT

Data and information used	Method, index	Adapted or used by	Hungarian applicableness
Employment data	employment-LQ	UK, Harvard Business School (USA), Sweden, Hungary	good
	number of employees, change in the number of employees	Harvard Business School (USA)	good
	Share of employment (SHR)	Harvard Business School (USA), Sweden	good
	agglomeration coefficient (AQ)	Sweden	good (in case data are available for all regions)
Transactions and connection among entities	input-output analysis	Finland, North-Carolina, Australia, Norway, Netherlands, Austria	problematic on regional level
	graph-analysis	Finland, Norway, Belgium	problematic on regional level due to the need for primary data
	qualitative methods	Denmark, Austria	good
Core industry features	added value	-	only industry and regional level
Export	export-LQ, separation of traded activities	-	no sufficient data
Innovation	number of patents	Harvard Business School (USA)	good
Location	maps	San Diego, Atlanta (USA)	good
Misc.	correspondence analysis	Germany	need for primary data
	enterprise-LQ	-	good
	growth of the number of enterprises	Harvard Business School (USA)	good

SOURCE: AUTHOR'S OWN TABLE

The mapping methods can be classified by the cluster definitions of the thesis as well (Cluster 1, 2, 3). Cluster 1 gives the broadest definition. The methodology becomes more complex starting from Cluster 3. Theoretically every method can be used at Cluster 1, the obstacles of domestic practical usage need to be taken into account at the empirical research.

5. Data sources of empirical research

The analysis of the hypothesis is using not only the evidence of publications also certain elements of the above-mentioned mapping methodology. The analysis of statistical data (mainly employment, enterprise and export data) helps to identify the clustering possibilities in Csongrád County and Szeged[1]. There is a qualitative case study detailing the possibilities of the biotechnology industry in Szeged, while statistical data help in "tailor-making" the picture, taking a detour to other high-tech activities, too. A survey has been done on the machinery industry and metal processing of Bács-Kiskun County; the result is shown on graphs[2].

The overview of the present state of the South-Great-Plain region is a mixture of publication evidence and empirical research. The region chosen because of its closeness and comfortability to study is presented through recent studies and results of statistical data, and also through its historical, cultural and social features. Besides emphasizing the less favoured character this presentation is necessary to judge the adaptability of the foreign best practice of clustering.

III. Consequences and results

The complex overview of the region has pointed out that this is eventually a less favoured region with more developed nodes. The agriculture is still dominant in most areas, and the gross value added per capita is still well below the national average.

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[1] The basis of this part of the chapter is my contribution to the 2004-2005 research of the University of Szeged: „The possobilities of the University of Szeged in local economic development".
[2] Based on my work as a project-manager at the Bács-Kiskun County Foundation for Enterprise Promotion.

Certain areas of the region have been analyzed with different methods of cluster mapping. Four analysis have been made:

    a) complex mapping of Csongrád County and Szeged with statistical data,

    b) qualitative study of the biotechnology of Szeged,

    c) statistical analysis of biotechnology and other high-tech activities of Csongrád County and Szeged with cluster-templates,

    d) graph-analysis of the machinery and metal-processing industries of Bács-Kiskun County.

6. Direct results of clustermapping

The complex mapping of Csongrád County and its capital is using employment, enterprise and export data. The results from the system of indices and criteria stress the role of traditional industries in the county and in Szeged as well. Amongst the identified potential or latent clusters there is Human Resource and Construction. We can presume the existence of a Textile and shoe industry, Meat, Metal and Machinery, Business Services, Rubber and Plastic, Vegetable and Fruit Clusters. We can find the followings from the list of Szeged: Human Resource, Construction, Metal and Machinery, Textile and Shoe, Rubber and Plastic.

The existence of the Biotechnology Cluster of Szeged could not be proven with qualitative approach due to the room for improvement in the area of the enterprises. Owing to the institutional background and respecting the Cluster 1-3 definitions of the thesis biotechnology builds only a latent cluster in Szeged. The statistical analysis of biotechnology and high-tech industries gave the same result. This analysis used so-called cluster-templates, which were designed from industries participating in similar existing clusters of foreign countries. It was revealed that there are not only problems with the statistical data mining, but the entrepreneurial basis is also weak.

The clustermapping of the metal and machinery industry of Bács-Kiskun County was performed through two questionnaires in 1998 and 2005. The study revealed that we could only talk about a machinery and metal cluster in the region as a part of the similar

cluster of Northern-Transdanubia. There is no significant business partnership in the region; partnerships can be identified with partners outside the region.

Industrial scope can be set based on the empirical research but the analysis of such is not applied for the whole region in this thesis. In Csongrád County apart from the construction industry and the Human Resource Cluster the concentration of traditional processing activities are recognized. Biotechnology and high-tech activities seem to have only the institutional background, this is the strength that hopefully attracts the missing parts: enterprises will appear in a critical mass. The analysis of the machinery industry of Bács-Kiskun County confirms that the region has strong relationship with the capital, with Transdanubia and with foreign countries.

The analysis and mapping of the economy of the region is the first step in the process of cluster development. The use of a development process enhancing the bottom-up clustering in the South Great Plain is reasoned by the preference of increasing social capital.

SME clusters have four typical groups of two dimensions. The names of the groups are not referring to strict and categorical forms of clusters, these are more the typical ways clusters operate. Clusters can of course differ from these, too. In case of missing or weak social capital there are "industrial agglomerations" or "artisanal agglomerations" created and maintained by external economies of mere geographical proximity. Provided there is also organizational proximity thanks to social capital and active supporting institutions, we can talk about "industrial districts" or "SME valleys", referring to the Silicon-Valley or numerous other "valleys" in cluster names[3], depending on the development level of the region. Artisanal agglomerations reflect Clsuter3 definition, industrial districts and SME valleys might as well correspond Clsuter1, and despite there are differences in the approaches.

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[3] Such examples are Hydrogen Valley in the automotive industry in Wales, Motorsport Valley in East-England, the so-called Medicon Valley focusing on life-sciences in Denmark and Sweden, and the Optics valley near Paris. These clusters are highlighted amongst the similar activity clusters, that's why they emphasize „valley" to reflect their exceptionality – they are just as exceptional in their own industry, as Silicon valley is exceptional in ICT or biotechnology.

7. Opportunities of clustering in the South Great Plain

There are two dimensions defining the mainstream of clustering in less favoured regions: social capital and the region's level of development. Artisanal agglomerations and industrial districts are expected to appear in the less favoured regions, with industrial agglomerations in the more developed nodes. Clusters are usually satellite clusters; their size does not usually reach the critical mass. This also applies for the South Great Plain. After classifying the cluster studies of publication evidence and defining the main attributes of clustering, the first hypothesis is confirmed.

Thesis 1: Knowing certain features of a region we can define those cluster types, which are expected to appear mostly with no regards to the economic structure of the region. In less favoured regions this means dominantly artisanal agglomerations, in some cases also industrial districts or industrial agglomerations.

Without defining the effectively clustering industries and economic activities of the region, the cluster types can be identified by knowing the peripherical, neofordist feature of the South Great Plain with its weak inner cohesion and lack of social capital. The second hypothesis is supported by the summary of the results so far.

Thesis 2: In the South Great Plain Cluster 3 concentrations are most likely to appear (artisanal agglomerations).

These opportunities have to be taken into account during cluster development and the economic structure of the region needs to be identified with clustermapping. The methodology offers numerous chances for empirical research:

    a) input-output analysis,

    b) graph analysis,

    c) correspondence approach,

    d) qualitative approach,

    e) inquiry into employment data,

f) misc.: number of enterprises, export, patents etc.

During the mapping process the region's level of development and the expected cluster-types define the methods to be used. Concentration can be shown through various LQ-indices and related statistical data. The analysis of such data is more difficult as the economy of less favoured regions is at a lower level of specialization. The main feature of the clusters in less favoured regions is geographical proximity; this can be measured with statistical data (or maps). Various LQ-indices are well applicable (aware of their disadvantages, too).

Thesis 3: Different methodology needs to be applied in clustermapping in less favoured regions than in more developed ones.

Diagram 1: Localization of main vendors / customers in the Bács-Kiskun County metal and machinery industry in 1998
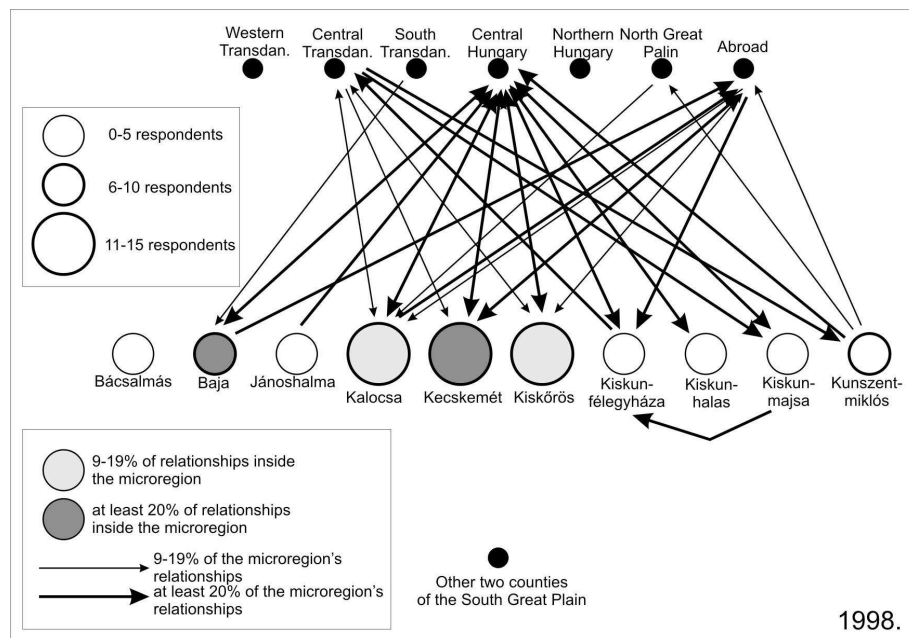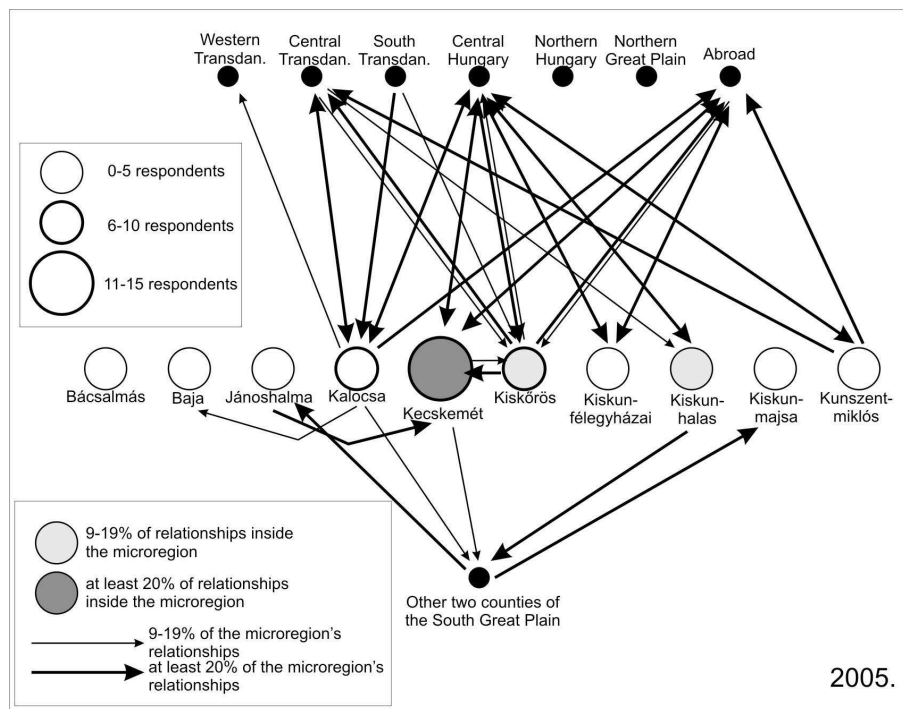

Source: authors own diagram

Thesis 4: In less favoured regions (as the South Great Plain) nodal regions need to be examined in the process of clustermapping.

The mapping of certain parts of the South Great Plain was based on LQ-indices, statistical data, qualitative methods and graph analysis. The empirical research confirmed that the economic relationships of the region do not correspond to the borders of the region, and the inner economic relationships are weak. As an example, metal and machinery industry of Bács-Kiskun county is more closely connected to the capital and to Transdanubia than to other parts of the region (Diagram 1, 2). It is more useful to analyse nodal regions if possible.

Diagram 2: Localization of main vendors / customers in the Bács-Kiskun County metal and machinery industry in 2005

Source: authors own diagram

It is further revealed that despite the presence of Szeged as a university and research pole, the mapping of Csongrád County shows the dominance of the traditional industries, mainly construction and human resource related activities. Qualitative analysis also showed that high-tech activities such as biotechnology are suffering from weak entrepreneurial background.

The first part of thesis 5 cannot be confirmed definitely. We could not identify Cluster 1 and Cluster 2 in the region's nodes, although biotechnology as a latent or embrionic cluster can be suspected. Based on theoretical studies and the typography of clusters it is assumed that such clusters can exist. Besides the development nodes the mapping of Csongrád County shows the clustering of low technology activities.

Thesis 5: In the South Great Plain the low-tech activities are most likely to cluster.

Less favoured regions have their own image and development path. The sample to copy or follow is not necessarily the innovative "top" cluster, more likely the concentrations of medium and low-tech activities supported by the endogenous resources of the region.

IV. Publications

1. Chapters in volumes

A dán építőipari klaszter. In Lengyel I. - Rechnitzer J. (eds.): *A hazai építőipar versenyképességének javítása: klaszterek szerepe a gazdaságfejlesztésben.* Régió Art Kiadó, Győr, 2002, pp. 125-134., 159-160.

A társadalom és a kultúra hatása a hálózatosodásra. In Czagány L. – Garai L. (eds.): *A szociális identitás, az információ és a piac.* SZTE Gazdaságtudományi Kar Közleményei 2004. JATEPress, Szeged, 2004, pp. 168-185.

Az építőipar versenyképességének javítása: építőipari klaszterek a fejlett országokban. In: Lengyel I. – Rechnitzer J. (eds.): *Kihívások és válaszok: a magyar építőipari vállalkozások lehetőségei az európai uniós csatlakozás utáni időszakban.* Novadat Kiadó, Győr, 2006, pp. 189-216. (co-author: Bajmócy Z.)

Térség sebhelyekkel – egy skót egyetem szerepe a gazdasági szerkezet átalakításában. In Lengyel I. (eds.): A Szegedi Tudományegyetem lehetőségei a tudásalapú helyi gazdaságfejlesztésben. JATEPress, Szeged, 2007 (to be published), p.15.

Empirikus tapasztalatok Szeged és Csongrád megye gazdasági szerkezetének vizsgálata alapján – klaszter-feltérképezés. In Lengyel I. (ed.): A Szegedi Tudományegyetem lehetőségei a tudásalapú helyi gazdaságfejlesztésben. JATEPress, Szeged, 2007 (to be published), p.13.

"Analyse this" – cluster-mapping in Szeged and Csongrád County. In Lengyel, I. (ed): The Opportunities of the Szeged University in the knowledge-based local economic development. JATEPress, Szeged, 2007 (to be published) p.18.

2. Articles in periodicals

A regionális klaszterek feltérképezéséről. *Területi Statisztika*, 6, 2005, pp. 519-541.

Regionális klaszterek feltérképezése a gyakorlatban. *Tér és Társadalom*, 3-4, 2005, pp. 139-158. (co-author: Deák Sz.)

„Látható kéz" és innováció – olasz iparági körzetek ma. *Vezetéstudomány,* 11, 2006, pp. 22-32.

Egy megyei szintű innovációs rendszer vizsgálata: Bács-Kiskun megye. *Területi Statisztika,* 2007, to be published.

3. Volumes and presentations of conferences

Klaszterek lehatárolásának módszerei. *3ʳᵈ Conference of Young Regionalists, Győr, 11-12 October 2002,* Széchenyi István University, CD-ROM. (co-author: Deák Sz.)

Klaszterek lehatárolásának módszerei. *Országos Tudományos Diákköri Konferencia.* Gyöngyös, April 2003.

Az élelmiszeripari együttműködések szerepe a térségek fejlődésében. *6ᵗʰ International Conference on Food Science, Szeged, 20-21 May 2004* University of Szeged, 2004, pp. 134-135. (+ CD-ROM)

Comments on the industrial districts of the Third Italy. *3rd International Conference for Young Researchers, 28-29 September 2004, Gödöllő, Volume II.* Szent István University, Gödöllő, 2004, pp. 146-152.

Potenciális klaszterek Csongrád megyében, és feltérképezésük nehézségei. *4ᵗʰ Conference of Young Regionalists, Győr, 13-14 November 2004,* Széchenyi István University, CD-ROM. (co-author: Deák Sz.)

Regionális és/vagy vidékfejlesztés. *3ʳᵈ Erdei Ferenc Conference*, Kecskemét, 23-24 August 2005, Volume 2, 2005, pp. 1072-1076.

4. Manuscripts etc.

A Harmadik Itália társadalma és munkaerő-piaci sajátosságai egy Storper-ábra alapján. Manuscript, September 2005, p.11.

Klaszter-feltérképezés: reménykeltő (?) pontok Szeged és Csongrád megye gazdasági terében. Manuscript, May 2005, p.64. (co-author: Deák Sz.)

Európa stratégiája: a biotechnológia. Manuscript, March 2005, p.20. (co-author: Katona D.)

A görög társadalom és a szegénység – egy mediterrán kultúra jellegzetes vonásai. Manuscript, July 2004, p.18.