Doctoral School of International Relations

THESIS COLLECTION

For the Ph.D. Dissertation of

Horváthné Boglárka Barsi

titled

The Spatial Location of the New Economy in Hungary

Supervisor:

Dr András Blahó
Head of Department, university professor

Budapest, 2006

Department of World Economy

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Contents

1 Research background and objectives, the reasons of topic selection

Today the term ‘new economy’ is used and understood by many people in many ways both in media and social science for the description of the global socio-economic processes and changes of the past decades. The increasing appreciation of the role of the intangible factors of production, innovation and also of information and communication technologies has introduced a new concept of digital economy.

Information and communication technologies (ICT) are covering not only a series of production and servicing technologies from computer hardware through software until all the services but also refer to wired, wireless and satellite telecommunication technologies, products and services. The emergence of ICT has had serious impacts on economic development, on productivity, on the nature, production and distribution of products and services.

Economic services are bound to space therefore they are functioning and developing at a certain point of space. Thus, the emergence of the new economy raises the question whether it is changing the spatial location of economic activities or not. Does it promote concentration or does it rather facilitate the spread of economic activities?

The new economy certainly comprises the potentials of the restructuring of space and the changing relations between and within regions. Although several international (and recently some Hungarian) researches have studied the spatial impacts of ICT we are still unable to give a clear definition on their socio-economic impacts on regional and local development. As the majority of analyses are rather descriptive researches so far have not investigated in details the start-up of new businesses, their development, the regions’ internal endowments and relations with active businesses and they neither studied the impact of ICT on regional policy and development.

The doctoral thesis has been written for the empirical presentation of the concept and approaches of the new economy, the demonstration of theoretical links between the new economy and space and illustrating them by practical examples taken from Hungary. Our major question is that *what kind of spatial structure ICT has in Hungarian economy*, whether it is linked to existing metropolises and other economic centres or are there any centripetal forces facilitating the ‘horizontal spread’ of economic activities.

The first two theoretical chapters of my paper are addressed to the following issues:

- Can the new economy be defined and if yes then how?
- What aspects and approaches should be applied when studying this phenomenon?
- What are the major features of the new economy? What is the interaction between centripetal and centrifugal forces in knowledge economy; whether localization or dispersion is the more dominating process?
- What regions are the winners of the emergence of the new economy?
- Are there any possibilities for closing up backwarded peripheral areas or is there a deepening gap between cores and peripheries?
- What are the empirical results of international and domestic researches?

According to our hypothesis having been formulated in the theoretical research *of the centrifugal and centripetal forces shaping the spatial structure of economy the role of centrifugal ones have greater dominance in industries generating high value added and knowledge based products and services.*

Although in theory modern communication technologies can be accessed anywhere practically their availability largely depends on the presence of fixed telecommunication infrastructure. This infrastructure is not available everywhere or at least it is not built up simultaneously everywhere. The building of infrastructure follows a strict economic logic therefore the first places where infrastructure is built, are those spatial units where demand and supply are concentrated on high level. Rapid technological development, quick changes in consumer demand, the liberalization of telecommunication have all resulted in increasing spatial inequalities in the physical availability of infrastructure. The emergence of the Internet has not changed too much this situation as the endpoints and networks necessary for Internet access are also strongly centralized (Gillespie et al. [2000]). All the important decision-makers are concentrated in big cities and the role of personal contacts – against our expectations – is still very important. 'Denser' industrial activities are resulting denser networks which significantly increases the volume of inflowing information which increases the profits resulting from the application of ICT technologies. ICT oriented businesses cannot exist without the access to relevant information and knowledge which can hardly be expressed in digital or textual format. In theory ICTs may have both centrifugal and centripetal impacts. The final form of spatial structure is shaped by the interaction and the resultant of these forces.

Cairncross, the creator of the 'death of distance' theory is himself expressing his view stating that 'the death of distance' is easing the tight limitations of geography but does not completely eliminate them' (Cairncross [2001] p. 5). This is due to the fact that the reduction of telecommunication costs is not homogenous all over the world. The dominance of large cities still exists in networked relations and in the agglomeration of face to face relations. Urban areas have still better network relations and they are still more competitive both in production and innovation activities.

The empirical research is grounded on the theoretical concepts and statements of this paper. Our empirical researches were targeted at demonstrating the spatial pattern of the location of information and communication technologies in Hungary. The research was focusing on the following issues:

- Do exist in Hungary any concentration points of ICT based industries and of Internet serving as an infrastructure for them? If yes, where are they?
- Where did the ICT sector emerge for the first time in Hungarian economy and have there been any changes in the elite group of ICT technology users during the past few years?
- Are the sectors of ICT separated in space, namely those not linked to processing industry or to any product-linked services?
- What kind of new business settlement factors do ICT sectors particularly processing industry and services create?
- What conclusions can be drawn from these for regional policy?

My analysis is starting from the *basic hypothesis* stating that *the location of businesses linked to Internet use and ICT is not homogenous but they are concentrated on certain areas. Knowledge and the presence of skilled labour have definitive role in the concentration of Internet access points and services.*

At the final part of my presentation on the empirical research on the basis of empirical research results I am going to give a theoretical summary on the site selection policy of ICT businesses. Our major question was that to what extent the traditional site selection theories are verified by the results of our empirical researches.

According to our *basic hypothesis the survey of new business settlement factors can only partially detect the determining factors of the emergence of new ICT businesses in a certain area.*

Thus, in several cases the emergence of new industries in a region may be the consequence of random factors but the timely demand of structural adaptation and the role of random factors do not guarantee total freedom for businesses in their site selection policy meaning that every region offers equal chances for them. New industries – by their nature – demand well-trained labour force, capital resources and other inputs i.e. a fair economic and social environment. However the range of alternatives to select from is still wide. The emergence of a new industry in a region starts a clusterisation process which is a self-generating process resulting in shutting the once in the past 'open windows' around some dynamic regions.

2 The methodology of research

The dissertation is based upon a continuous research started in 2001 comprising a detailed investigation of some Hungarian regions (the main sites of research were Győr-Sopron County and some settlements (Győr, Zirc). The methodology of research comprised the compilation and query of statistical data, indices and indicators which served as starting points for the empirical analysis of my paper. The international literature of the new economy is fairly wide and complex, the research issues covered (or coverable) by the concept of the new economy have become fairly popular during the past two decades. Besides papers analysing the concept of the new economy, a growing number of more and more complex and various papers have been published on the spatial processes, regional features and settlement factors of the new economy.

The discussion of these issues started with some years' delay in Hungarian literature and was principally concentrating on researches associated with the broader concept of the new economy. The researches on the spread and regional impacts of the new economy in Hungary look back to a short history only and they have mostly been carried out by the researchers of Centre for Regional Studies Hungarian Academy of Sciences (CRS HAS). Some parts of research were concentrating on the workout of various indexing systems and on measuring the development level of Hungary's certain areas (counties, microregions, cities) on the basis of standard figures set up with delimiting regions showing similar development features. The majority of researches, with the exception of the smallest spatial units, investigated regions counties or the Hungarian urban network. Very few comprehensive researches with detailed investigations of the new economy on local or microregional level and embedding them into the current theoretical concepts and surpassing the descriptive level trying to go down to the reasons have been carried out so far. For this reason the author of this paper is urging for a more detailed analysis in this field.

Beyond the presentation of the international and Hungarian literature on the concept of the new economy the major theoretical works demonstrating the relationship between the new economy and space have also been processed in this paper as on theoretical level very few domestic papers have presented the spatial features of the new economy.

Following a review on the theoretical foundations I used empirical research methods for analysing the emergence of ICT in Hungary on the basis of statistical data collected by

the Central Statistical Office, by the National Communications Authority of Hungary, and on the basis of a domain name database selected and sorted by the Alföld Research Institute of CRS HAS.

As yet only a very limited amount of data is available on local and microregional levels these data had to be completed by the author's own data collection. Such example for that is the author's sorting and aggregation of company data into local (settlement) level and the collection of settlement level data related to knowledge and innovation indicators. In performing these latter tasks the author's earlier experiences gained in the research projects of the West-Hungarian Research Institute of CRS HAS were a great help. This giant database with nearly 50 variables between 1992 and 2004 served as a basis for my research where beyond the descriptive method I used correlation analysis, main component analysis and regression calculations for a wider demonstration of the spatial location of ICT and its determining factors.

3 The results of the dissertation

For clarifying the basic issues of research we have carried out comprehensive theoretical and empirical researches. Their results can be summarised as follows:

3.1 The concept of new economy and its major features

No single interpretations exist on the concept and definition of the new economy either in international or in domestic literature. The definitions depending on the dimension of research and on the method of approach are covering a wide palette. Due to these circumstances we can only give either a too broad definition hiding the special features of the term or very differing ones concentrating on some of its common features but highlighting different aspects. This paper is giving new information by the presentation and analysis of the different views published in domestic and international literature. Following the classification of Szalavetz and Török we categorized the concepts of new economy into four different groups (Szalavetz [2002a], Török [2004]):

- Macroeconomic, economic theoretical approach.
    - The analysis of the relation between economic growth, productivity increase and the new technologies as principally a macro-level interpretation of the new economy, i.e. an investigation of the relationship between ICT, the investment into information and communication technology and the growth of economy or productivity.
    - The authors are starting from the extended Solow model which is based on the assumption that investments into ICT should increase productivity and output. However the empirical research of the model has proved that investments into information and communication technology do not significantly contribute to the increase of productivity. Therefore in case of ICT the so-called Solow paradox is coming into force.
    - This paradox phenomenon has been resulted from several reasons. On the one hand, the application of the neoclassical model is an explanation even if we disregard the problems of

using the Cobb-Douglas productive function, of the continuous value decrease in case of all capital types and of the problems of steady growth. On the other hand, it is also a problem that these products represent knowledge in such a high degree that they behave as knowledge themselves, i.e. the access to them is unlimited, their dimensions are endless; also the effects of productivity and competitiveness largely depend on institutional and organisational structures.

- Microeconomic, primarily corporate-economical interpretation.

  In this sense new economy means a new economic, new corporate economic and business model:

  - The integration of product-oriented thinking with action for a better utilisation of the skills of actors directly involved in production and for quick problem solving.
  - The majority of 'raw materials' is generated by external businesses.
  - Flexible workplace responsibility.
  - Few hierarchy levels (flat hierarchy).

- Infrastructural, quantitative approach

  In this sense importance is assigned not to the macro- or micro level operation principles of economy but rather to the critical mass the telecommunication infrastructure should approach so that the fundamental basis of the new economy could be created. Therefore information and communication infrastructure and its quantitative measurement should be emphasized with other factors in the identification of the criteria of competitiveness.

- Sectoral approach

  This interpretation intends to identify those sectors of which development is significantly affected by the new economy. Probably this question should not be formulated in this way but rather the weight of the 'new economy' component should be investigated in the activities of business organisations.

One thing is sure and identical in all research teams' definitions: *the outstanding role of knowledge (both in quantitative and qualitative aspects) and innovation in the new*

economy. The four essential elements of the new economy can be summarised as follows:

- Knowledge is the acceleration of production. The generation of knowledge and its integration into production has accelerated so much as never before.
- The role of intangible capital has increased in production.
- The increasing appreciation of innovation, its penetration into everything and the enhancement of the types, sources and forms of innovation.
- The revolution of the instrumental base of knowledge (the revolution of technology necessary for generating and disseminating information and knowledge).

3.2 New economy in space

According to our basic hypothesis set up in the theoretical research of *centrifugal and centripetal forces shaping the spatial structure of economy the centrifugal ones have dominating force particularly in case of industries generating high value added and high knowledge content products and services.*

The theories having been formulated on the relationship between the new economy and space can be divided into two major groups:

- The members of the first group following the 'death of space' theory are on the opinion that due to the application of new technologies economic activities are shifting from core areas towards peripheries and this process will create a 'global village'.
- The members of the second group are on the opinion that the emergence of new technologies further increases the present economic disparities by strengthening the position of core areas and metropolitan regions. Although in theory modern communication technologies can be accessed anywhere practically their availability largely depends on the presence of fixed telecommunication infrastructure. This infrastructure is not available everywhere or at least it is not built up simultaneously everywhere. The

building of infrastructure follows a strict economic logic therefore the first places where infrastructure is built in are those spatial units where demand and supply are concentrated on high level. Rapid technological development, quick changes in consumer demand, the liberalization of telecommunication have all resulted in increasing spatial inequalities in the physical availability of infrastructure. The emergence of the Internet has not changed too much this situation as the endpoints and networks necessary for Internet access are also strongly centralized (Gillespie et al. [2000]). All the important decision-makers are concentrated in big cities and the role of personal contacts – against our expectations – is still very important. 'Denser' industrial activities are resulting denser networks which significantly increases the volume of inflowing information which increases the profits resulting from the application of ICT technologies. ICT oriented businesses cannot exist without the access to relevant information and knowledge which can hardly be expressed in digital or textual format.

We have come to the conclusion that *ICT may have both centrifugal and centripetal impacts. The final form of spatial structure is shaped by the interaction and the resultant of these forces where the role of centrifugal forces seems to be more dominant.*

3.3 The spatial location of the new economy in Hungary

The empirical research is grounded on the theoretical concepts and statements of this paper. Our empirical researches were targeted at demonstrating the spatial pattern of the location of information and communication technologies in Hungary where I started from the *basic hypothesis* that *the location of businesses involved in Internet use and ICT is not homogenous but they are concentrated on certain areas. Knowledge and the presence of skilled labour have definitive role in the concentration of Internet access points and services.*

For the support of my hypothesis my research was based on statistical data collected by the Central Statistical Office of Hungary, by the National Communications Authority and a domain name database selected and sorted by the Alföld Research Institute of

CRS HAS. At a later phase of my research I could use a comprehensive local (settlement) level database having created in earlier research projects. By using this latter database I had an opportunity for performing deeper analyses beside the descriptive statistical methods.

The research on the spatial location of ICT in Hungary is hindered by several factors such as the poor availability of statistical data, their timely limitations, inappropriate territorial division and several other circumstances. The investigation of some factors having been presented in the theoretical background chapter such as non-codified knowledge, the further radiation of knowledge, the role of personal contacts, historical factors, the founders' personal preferences and other 'soft' factors would rather be a complicated task and due to these circumstances statistical data and analysis methods themselves are inappropriate for providing an exact overview of the situation in all of its details.

1 Despite the limitations of the statistical method we managed to delimit those areas that are more specialised in information and communication technology than others:

- *The outstanding role of the agglomeration zone of Budapest seems to be evident* in the field of processing industry and non-product linked services. However this group is rather heterogeneous, therefore by applying different research methods we have sorted the member microregions and settlements of Budapest agglomeration into different groups. The special situation of Budaörs could easily be identified and this city was treated as a separate unit in our investigations of clusterisation.
- *The three biggest university cities – Szeged, Pécs and Debrecen but especially Szeged* – are obviously also in a distinguished position. Miskolc the fourth campus city can potentially be in the same row with the first three cities but its relative indices are far worse than theirs. Although due to location indices based on the number of ICT involved businesses and due to the absolute number of domain names the city and its region are among the ICT specialised regions but the general weight of ICT related businesses is much weaker there than in the first three cities. However as the city has great internal potentials regarding demands and human capital resources the ICT

sector in the future may undergo a significant development here. The distinguished position of these four cities has been resulted not only from their good human resource potentials but also from their advanced research-development activities. As in Hungary – due to the transformation of the economy - the majority of corporate research organisations have been closed. Not only has the funding of R&D diminished but also the number of researchers has been significantly reduced. Therefore by now in Hungary research institutions have primarily been incorporated into the organisational structure of the Hungarian Academy of Sciences or have merged into other institutes sponsored by the Hungarian Academy of sciences or into universities. Three fourths of the total research organisations are located at the three university centres often referred to as the 'citadels of science' (33% in Szeged, 27% in Debrecen and 16% in Pécs). It is not by chance that ICT services have an outstanding role within this group.

- *Besides these great regional centres some minor centres are also important for ICT such as Győr, Székesfehérvár, Veszprém, Kecskemét, Nyíregyháza and their environs*. Here the importance of Székesfehérvár is extremely high having primacy both in the relative and absolute indices of this category. These are important but minor centres of higher education with favourable innovation potentials facilitating the emergence and development of non-product based services. Their past industrial traditions are favouring for the development of processing industry which – with the exception of Székesfehérvár – has rather quantitative than relative importance in these cities.
- *The last important territories of the ICT sector are the microregions of Tatabánya and Tiszaújváros,* the areas of successful and relatively fast economic transformation. The development of these cities has been founded by their past industrial traditions, by their diversified industrial and economic structure, by the cheap and relatively well-trained labour force, by the well-established and careful economic policy of local municipal officers and by the careful planning of industrial development policy. Here the dominance of processing industry is manifested both by absolute and relative indicators.

2 By analysing the major settlement factors of industrial plants and businesses we have come to the conclusion that the size and the economic development of a region do not have significant impacts on the importance of the ICT sector therefore we were seeking for other relevant factors. We have found evidences on the fact that factors associated with the presence of knowledge and trained labour force have key role in the use of Internet and in services.

Thus, our empirical researches have verified our hypothesis.

3 In the next phase of research we have put the empirical researches into the context of theoretical concepts and came to the conclusion that the analysis of settlement factors gives only a partial for the question what factors determine the settlement of ICT sector bound businesses within a region. The development of an industrial sector is shaped by the interaction of several factors such as historical and random events, the emergence of spin-off and agglomeration effects. At the emergence of a new industrial sector there is a great ambiguity what skills, knowledge, product and potential demand are expected within this sector. For this reason the potential entrepreneur has two alternatives. In the first case he may select a site he knows well or because he worked there in the past or he can assess the region's market potentials and the available labour force resources. In the second case he may set up his new business next to the first client or into the environment of potential large number clients to secure a continuous link for the development of appropriate products and services.

4 Thus, at the initial development stage of the industry the number of potential sites is fairly high. With the standardization of products and processes the competition is getting tougher and the industry is getting concentrated especially in regions with successfully operating businesses. This was reflected by the dynamic investigation of ICT businesses pointing out that although the activity of ICT businesses has spatially spread with the time passing but the elite group of successful businesses has not changed, their initial advantages have proved to be persistent.

5 And finally our implications for regional policy do emphasize that creating a generally fair economic environment with trained labour force and adequate training and knowledge centres is the key factor for attracting ICT businesses. The presence of these components significantly reduces the role and efficiency of regional policy.

3.4 Future research areas

The research of the spatial location of information and communication technologies and of their impacts on spatial structure provides an opportunity for opening further research areas. The Hungarian spatial structure of ICT and in a broader sense the elements of the new economy, their business settlement factors, the dynamics and the development of the new industrial sector and the refinement of the new industry's analysis method may have dominating role in the new research areas of the future.

Due to the limitations and sometime contradictory data of statistical inputs the data collection process is not comparable with such an innovation research where new and specifically structured data have been collected by applying qualitative and quantitative methods. As the majority of indices has been gained from randomly accessible data records and statistical collections it cannot be regarded as homogenous even from a timely perspective. In case of some innovation indicators the collection and filtering of settlement data needed heavy efforts but they are very near to meeting the requirements of coordinating the rationality and reliability criteria of future data collections.

A similar problem is that during generating indexes traditional macro-indexes were converted into local indexes partly because the Central Statistical Office and other institutes are collecting data in this very structure, partly because this made possible for us the analysis of several territorial levels (national, regional, and microregional). However these indexes several times hide the quantitative differences between regions (just take for example the analyses of higher education and patent indexes) which may have fundamental impacts on site selection policies. The investigation of cooperations, agreements and developments is also a problematic area of research. For this reasons a statistical analysis method should be elaborated which is capable for the management of the above-mentioned problems and formulating proposals for institutions collecting statistical data in Hungary. We consider the revision of the national, sectoral and

municipal level statistics of ICT very important and we are proposing to establish a databank providing up to date information on accessible databases at different database hosts and collecting or partially processing the major national and regional (county or local level) data on a regular basis.

The researches having been carried out so far are making it obvious that a deeper analysis of different processes demands not only the studying of the micro-level elements of space but also requires a series of personal questionnaire and deep interview with the different employers and employees working in this sector for the following purposes:

- To get a more profound picture on the hidden reasons of the spatial permeation of ICT businesses (including processing industry and services separately) and to explain them with the site selection dynamics of businesses with the employees' commuting patterns and with their expectations of living standards, housing and working conditions.
- To explore and to understand the relationship of ICT businesses and industries with their environment, the dynamics of this relationship and its changes during the development of this sector and the way how they can shape an area for their own purposes in a creative way.
- The deep interview based analyses are creating a basis for the investigation of soft factors as well such as non-codified knowledge, the role of personal contacts, the further radiation of knowledge, historical factors and the founders' personal preferences.

Researches analysing not only the spatial location of ICT as a separated sub-sector of the economy but rather the impact of the use of new technologies on the spatial structure and site selection policy of the traditional industrial sector can open further directions in the research.

And last but not least with the analysis of national, regional, microregional and local level strategies of information society and economy, operative programmes having prepared in Hungary during the past few years, the theoretical and empirical foundations of the national development plan and by carrying out researches on the spatial impacts of the realised actions and projects we can further refine the lessons and proposals having been formulated so far for regional policy.

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