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The Effects of the Information Society on Spatial Development – Hungarian Case Study

**by
Ákos SZÉPVÖLGYI**

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Zoltán GÁL

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This paper is a shortened version of the PhD thesis of the author that has been finished in 2008. The paper summarizes the main theorethical and empirical results of the related research activities. To make all this investigations could not have been taken without the valuable help of my two professors, namely Prof. István Süli-Zakar DSc. and Prof. Viktória Szirmai DSc.

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1 Introduction

1.1 What are we investigating?

The development of technology and economic restructuring permanently change the general circumstances of economy and society and rearrange the general parameters of socio-economic environment. Today's world economy now is also undergoing such a transformation period which is clearly manifested by the emergence of the information society (IS).

According to our present knowledge the currently formulating information society has its impacts on spatial structure as well. The spatial differences of the different forms of information and knowledge are increasing and the motives behind spatial disparities are getting more and more complex (*Meusburger,* 1998 citing *Berényi* 2003, 101–102). These differences on the one hand are arising from the fact that *new technologies, organizational settings and jobs are inducing new spatial disparities*. Its primary reason is that peripheries have never served as action centres of the spatial diffusion of knowledge and the spatial distribution of the socio-cultural factors of development is not homogenous.

Although the time of information flow has significantly been shortened but the recipient's educational level, creativity and position in the social hierarchy are still factors of key importance and bound to place, i.e. they are spatially differentiated. This means that *the elimination of distance does not necessarily decrease the importance of space and the fewer are the obstacles arising from spatial distance, the greater is the importance of the other local factors,* which means that the role of comparative advantages and of the factors of spatial adaptation will be revaluated (*Rechnitzer,* 2003).

Now it is unclear yet to what extent information society will affect spatial structure (*Erdősi,* 1990, 1991; *Rechnitzer,* 1993, 2000; *Nagy,* 2002; *Teller,* 2000). It is generally approved in literature that *in Hungary this process runs at all the levels of spatial hierarchy*. Its major benefactors are cities, metropolitan areas and medium-sized cities with extensive higher education system, diversified industrial structure and advanced public services (*Gillespie – Robins,* 1989; *Nagy,* 2002). On the other hand there is a general consensus that the peripheral elements of the spatial structure are obviously in handicapped position.

Because of the high speed and the great complexity of the transformation process the relevant complex analyses – unlike traditional researches on general socio-economic development factors with wide-scale research results – have not yet dealt with this issue in full coverage.

For social geography the above-mentioned phenomena mean not only a chance for eliminating space. The emergence of information society – as a new research

problem – has become important not only as a functional utilization of space and as a change in the patterns of social behaviour as a result but it also raises the necessity of investigating the conditions of adaptation and of analysing its spatial differences and cries for assessing their impacts and outcomes (*Mészáros,* 2003).

1.2 What were our objectives?

As it was earlier mentioned our research is targeted at assessing the spatial impacts of the information society and at exploring the special features of the different levels of settlement network and of the spatial organization system. We do this on the one hand by starting from the assumption that individual settlements and spatial units react in different ways to these processes and these differences determine their long-term development perspectives as well. On the other hand we also think that the position of areas undergoing different processes of socio-economic development has been changed by the impacts of the emerging information society as well. Regarding this our aim was to carry out an integrated social, economic and technological analysis on those special features of information society – as a social development paradigm – that are relevant to spatial processes.

Considering these aspects our research objectives were set up as follows:

- First we are going to explore through an evaluation of the Hungarian and international literature the characteristic features of the information society as a social development paradigm, how its major factors have changed and which of its major territoriality related impacts.
- Our next objective is providing a complex definitive analysis on the social impacts of information society. This process will include a detailed survey of core-periphery relations and of the characteristic features of the nodes of development.
- And finally we are trying to answer the question what determines the adaptive skills of the different regions. Within this set we are going to identify the major differences between the adaptive skills of regions with differing socio-economic background.

Following the above-defined research objectives this paper can be divided into two major parts. The first part explains the theoretical concepts and the socio-economic impacts of the information society through the survey of international (preferably English-American and German) literature. In the second part we are going demonstrate some empirical results.

1.3 How did we do our research?

When carrying out the preparatory studies of this paper we applied a wide range of the instruments of social science research which included methods applied in social geography, sociology, regional science and regional statistics.

For the theoretical foundation of the research topics we summarized and evaluated the results of the international and Hungarian literature through applying a predefined set of criteria. Meanwhile we were also concentrating on clarifying the interpretations, the spatial impacts and the outcomes of those aspects of information society which were emphasizing spatial aspects. The methods applied in the empirical research – which will be presented in details in the relevant chapters – are originating from two sets of sources.

The first set of sources includes a one and multi-variable data analysis based partially on data collected from the Internet and partially on our own dataset analysed by using the SPSS software. The second research method included questionnaires and interviews and the processing of their results. The second set of resources consisted of the individual partial research instruments provided by the Central Transdanubian Research Group of West-Hungarian Research Institute CRS HAS (MTA RKK NYUTI KDKCS) and partially from the joint research programme implemented with the Sociological Research Institute HAS between 2001 and 2006.

2 How do we evaluate information society as a theoretical issue?

2.1 What are the characteristic features of the emerging information society?

The emergence of the information society is an outcome of a series of long-term technological and structural changes. In broader sense it means the globalization of manufacturing, services and media industry as a result of the development of information and communication technology and also a changing lifestyle, a different way of personal contacts in community while in narrow sense it means a technology change driven difference in social development paradigm complementing socio-economic development (*Fodor,* 2000).

The change of industrial society into information society starting in the first wave from the 1960s for the free generation, spreading and utilization of knowledge (*McLuhan,* 1964), was based on the simultaneous rapid development and wide-scale integration of telecommunication, computer technology and media industry (*Nagy,* 2004).

The literature is not homogenous regarding the naming of this process, as – emphasizing different aspects – several alternative terms exist for the definition of

this paradigm of social development.[1] For labelling these extensive socio-economic changes the terms 'information society' and „knowledge society', carrying a partially different meaning, are used the most commonly (*Nyíri* 2000). The meaning difference between information and knowledge society has neither been clarified. However the majority of authors agree that the two phenomena are built upon each other. In our paper we are going to use the term – information society. We do this because the component factors of information society are at an early development stage yet and even in countries with advanced economy the technical conditions for accessing to knowledge on wide scale are not yet provided, the degree of democratisation is below the desired level, only some elements of the liberal network-based economy are functioning and an efficient education system has still not built up yet (*Faragó,* 2003). Thus, today information society refers to such a socio-economic environment where transformation is initiated by the development and spread of modern, electronics based information and communication technologies (ICT)[2] and this increases the importance of possessing information. This rhymes with the opinion of OECD regarding the phenomena of information society very important elements of globalization (OECD, 1996). This means that the main driving forces of globalization are the development of information and communication technologies – which create a basis for IS as well – the intensification of world economy, the wide-scale growth of market economy and the expansion of super-national level democratic institutions.

On the basis of the mainstream dimensions of social changes several researchers have attempted the conceptual clarification of the term: information society (*Farkas,* 2002; *Scheinstock* et al. 1999). The papers analyzed are differentiating (or naming) the conceptual categories of information society as follows. At the same time they are also marking what social development phase is followed by the IS:

- information economy (it is based on Machlup's theory of knowledge industry and regards employing in new industries as the milestone of the age of information society),
- post-industrial society (its major model-maker is Daniell Bell speaking of a multi-dimensional social change and prognosticating an evolutional (non-radical) socio-economic transformation),

[1] Among the appoved by the broader scientific community terms there are such labels as technotronic society (Brezinsky), intellectual technical society (Danzin), dual society, information mode of production (Castells), global village (McLuhan), third wave (Toffler), education revolution (Drucker), wired society (Martin), personal society (Halmos), fifth Kondratev-cycle (Freeman).

[2] Later on we well provide a more detailed explanation of the notion of ICT, but here we would like to mention that by this denomination we mean a collective term of technical devices, checking techniques, media, organization modes and economic activities.

- the end of industrial labouring society,
- scientific society (by *Berényi's* [2003] interpretation this means that science will be present in all the fields of social activities and by pushing out the traditional forms of learning knowledge will become a direct force of production and the legitimate basis of power will stand on the possession of special knowledge),
- information-based industrial society (it considers the spread of ICT as a basis for economic (and social) changes, though it is clearly tending to emphasize the role of information instead of ICT),
- learning society (it is most clearly described by Castells stating that learning by activity and interaction (within individual and institutional framework) is the most important element).

Bearing all these in mind *Farkas has created the – generally approved – definition of information society which we also regard as a starting point. By this interpretation we can speak of a new form of social organization where the production, selling and application of information are the major sources of productivity and power* (*Farkas,* 2002). This definition on the one hand is built upon the new type of society envisaged by Yonei Masuda of which transformation and development is generated by the utilization of the power resources of information (*Masuda,* 1988). On the other hand it is also based on Manuel Castells' interpretation stating that this is such a society which organizes itself on knowledge with the purpose of managing social control, innovation and changes.

The definition of Z. Karvalics László may also be regarded as a major one for the definitive standpoint of analyses approaching the scientific term of information society from six aspects (*Z. Karvalics,* 2002). On the first place he speaks of information society which by Naisbitt's comprehension started in the USA by increasing the rate of workers in the information sectors over 50% and marks only an economic change of period. On the second place here also appears the image of post-industrial society which according to *Bell's* (1973) opinion means the suppression of traditional power resources. On the third place the new social image and idea is emerging. The major author of this theory is Yonei Masuda envisaging communities of new type (or rather the transformation of the existing communities), a change in values and in the basic attitudes towards environment. On the fourth place an application attitude is coming up in which the changing organizational mode of economic activities, the emergence of network systems and the spread of new consumer habits are the key elements. The professional political attitude can neither be disregarded stating that economic and technological processes combined by social planning will create an information society even in short-term perspective. And finally we must mention here *Stehr's* (1994) definition saying that the new international operational mode of science and knowledge lead to information society.

The emergence of the new paradigm of social and economic organisation is due to several factors (*Gervai* et al. 1999). The first is welfare society having been established in the USA and West-Europe after the Second World War (particularly due to the freedom of consummation and motorization). The second in timely sequence as well factor is computerization (technological revolution) [*Butt* 2004]. Its scientific link points are defined by *Toffler* (1970) and *Bell* (1973). They both envisaged a technology-based social norm defining radical change. The third set of factors is the access to communal and social level information, the democratization of IS which has been evolved by the emergence of Internet. This by *Lamberton's* (2002) opinion is extended by a change in the economic actors' decisions and market positions. It is followed by the transformation of global social systems which prognosticates the emergence of postmodern society (*Castells* 2005). Beyond these its determinants are globalization, new products and services, labour organization processes and a bilateral communication communication with the sources of information (*Barabási,* 2003).

From theoretical aspect we consider the process character of IS to be the most important. We are starting from the assumption that the development process of information society as a social development factor can be divided into partially overlapping by timely and content aspects but by approach method clearly distinct development stages. By our model the process consists of three (separated by quantitative and qualitative aspects) waves (*Figure 1*).

By this interpretation IS has shifted from primarily quantitative elements towards qualitative aspects, and from a simple towards a complex system. Naturally, the basic dimensions shaping the individual waves are not clearly separated from each other; they still 'exist' and develop in the next wave. In the following part of my paper I am going to demonstrate the characteristic features of the three development stages.

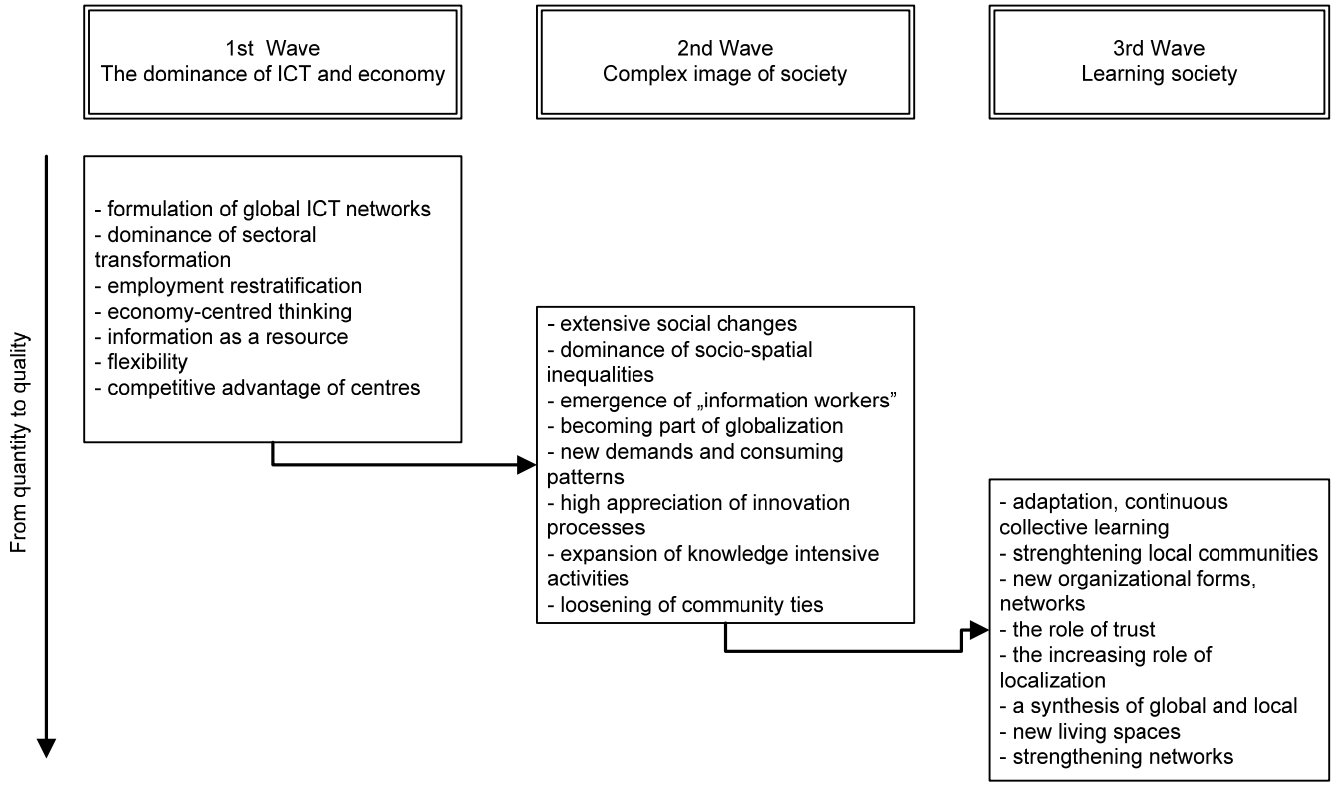
2.1.1 The first wave

The definition of the first wave of information society in literature is following a two-dimensional approach. The relevant scientific definitions on the one hand are emphasizing the importance of technology, i.e. their approach has a strong technocratic character. On the other hand they are primarily economy-oriented, i.e. they consider the sectoral restructuring of the economy (post-industrial period, tertialization) the major element of IS.[3] It should be emphasized that the ideas of

[3] Naturally the representatives of the first wave marked several other processes as important but these two dimensions are serving as a basis for their viewpoints. This is verified by the fact that the early researches of information society prognostified a change freeing human creativity, enabling free decisions and everyone are free to express their opinion and technology will enable the expansion of choice alternatives and the introduction of a democratic communication system (*Splichal,* 1994).

Figure 1

The development scheme of the information society



Source: The author's own edition.

the first wave are associated with the forecasts of positive changes only. This – by our present-day knowledge – is a rather disputable and oversimplified viewpoint in the current technological and economic settings.

Bell (1973) is on the opinion that industrial society can be characterized by the dominance of machine technology while (after his naming) post-industrial society can be described by the dominance of intellectual technology (information and knowledge). By this statement he re-defined the relationship of technology and society where the dominance of goods manufacturing is replaced by the dominance of services, the systematization of theoretical knowledge has a key role in technical innovations and intellectual technology is evolving. At this stage human services can be regarded as key processes (such as public health and education) with such professional services as research-development or demands for system analysis (*Mattelart,* 2004, 87; *Johnson* et al. 2000).

However it was not Bell who first prognostified the necessity of paradigm change, i.e. the new post-industrial way of the change of society. *Clark* already in 1951 visualized the „age of services", as the newest period of social development. But Fritz *Machlup* (1962) also emphasized the increasing socio-economic role of information and named five 'industries' as the major areas of change (cited by *Cohen* et al. 2000). They are education, R&D, communication media, information technology devices and information services.

However it was *Masuda* the first to identify information society as information-oriented public utility or a global communicational network (*Masuda,* 1988). With this relevant the approach stating that IS is such an ICT-based global community (consisting of organizations and individuals) where the members are building, developing and using the ICT (*Brachos* et al. 2005, *Freeman,* 1994). Neproponte's technology-oriented viewpoint also agrees with this idea but does not prognostify extensive spatial and social impacts (*Negroponte,* 2003) and other authors also agree that ICT itself may become a catalyst of globalization (*Archibugi* et al. 2000). Today we can definitely state that these approaches are only partially suitable for identifying the real processes. This is explained by the fact that the evolution of information society is not driven by technology but rather facilitated by ICT only.

Of the Hungarian researchers Ferenc Erdősi also approached information society from the side of technology and he identifies it as telecommunication combined with informatics. By this interpretation on the basis of the technical devices and of the informational integration of telecommunication he differentiates traditional telecommunication and telematics (*Erdősi,* 2002). He is on the opinion that advanced communicational networks support the division of labour, spatial specialization and the increase of productivity (*Erdősi,* 2002, 88). The author interprets the spread of ICT as a new Kondratyev cycle (post-industrial wave) which differs from the previous one in such a way that it changes the flow of informa-

tion instead of the spatial movement of people and assets (*Erdősi,* 2002; *Berényi,* 2003).

All of the above-listed approaches are common in describing a new paradigm which is based on information and is associated new technologies have an impact on all of human activity (economic, social etc.) and it uses the network logic of systems, it is based on flexibility and creates integrated systems. However today it is still disputable whether the development of ICT is an outcome or precondition or in other words what the relationship is between ICT services and socio-economic development (*Borsos,* 1997). Yet it is also unclear whether this process will be expanded to the peripheral zone of world economy as well (*Szalavetz,* 2002). We firmly state that the competitive advantages of core areas (and the stable handicapped position of peripheries) can clearly be seen as the traditional economic environment is unsuitable for the present process of technological development as it would require such a socio-economic structure which – just as core areas – would be suitable for a flexible and continuous organizational adaptation to the constantly changing environment (and this is taking us to the second and third waves of development).

2.1.2 Second wave

The approaches related to the first wave had such aspects which demand a complex evaluation. By our opinion they are questioning not the validity of the earlier approaches related to the first wave but rather their exclusivity. *We think that the today still dominant second wave is prognostifying wide-scaled social changes concentrating on the emerging spatial and social differences*. With this – in a right way – it emphasizes the necessity of evaluating both the positive and negative impacts and consequences and also the necessity of calculating with the individual, economic, social and spatial features.

Naisbitt (1982) using information society for the first time as a concept defines 10 complex processes determining the process of world economy and social structure of which the problem of IS is a part of. Naisbitt thinks that the theory stating that the new social norm can be bound to the growth rate of jobs in the servicing sector is wrong as it does not initiate changes but it is rather due to the fact that the majority of employees use information for their work.

Anttiroiko in a similar way to Naisbitt's approach differentiates several main (globalization) trends (*Anttiroiko,* 1998). By his theory information society as an important slice of globalization is an outcome of various changes such as the emergence of global economy, technological development, the spread of 'instrumental' networks, changes in culture and identities and of the challenges of sustainable development. These changes together are building up the information society. The development of technology reduces temporal and spatial determi-

nance and organizational changes increase organizational flexibility. Furthermore local community and cultural linkages are weakening and following the changing patterns of consummation will result in the transformation of physical environment. We must emphasize here that the reshape of local communities can only partially be regarded as a positive phenomenon. It has such negative impacts as individualization or a complete exclusion of certain social groups (*May,* 2002).

At this stage of development the role of non-material resources in the maintenance or even in increasing the dynamics of development will further increase. Of them the role of skills, know-how and professional education level can be emphasized. Under this set of circumstances knowledge turned to be the major driving engine and learning (principally in the third wave) turned to be the dominating process (*Castells,* 2005; *Druckner,* 1998; *Lundvall – Johnson,* 1994). Within this framework the present socio-economic development process is driven by three factors. The first is the development of info communication technologies, the second is the intensification of specialization and the third is the change in the character of innovation processes.

Castells (2005) who can be regarded as one of the main theorists of our age specifies the current process as the information method of development. According to this theory the main source of development is the quality of knowledge determining the way and the place of the utilization of tangible assets and the growth of social capital (*Anttiroiko,* 1999; *Savage,* 1995; *Rheingold,* 1993). By Castells' opinion IS is nothing else than a new type of human coexistence in which the generation, storage and exchange of information play the key role. The informational mode of development in its approach means a fundamental change in the characteristic features of development in which the change of production has an extensive impact on social structures as well. Thus, information society all in one is marking such a social formation where the informational mode of development determines the allocation resources, the growth of social capital and the exploitation possibilities of intellectual potentials. In this approach information society is built on three components: infrastructure, demand and knowledge (*Alföldi,* 2006).

We also emphasize that the economic and regional science related approaches of innovation become parts of the definition of IS in just this development phase (which will be the elements of the third wave). According to their interpretation the primary objectives of learning, science policy, technology and innovation are generating and disseminating knowledge (*Drucker,* 1993). In the last decade of the above mentioned components learning and knowledge as the driving engines of economic development were paid special attention. It is very important that researches have different opinions on the role of ICT in this process. The majority are on the opinion that data and information transferred by the means ICT do not necessarily generate new knowledge. This means that data and information cannot

be identified alone but only in the context of their background settings (*Lundvall – Johnson,* 1994; *Scott,* 2000).

Analysing this period Hungarian literature emphasizes that technological development alone does not take us to the content elements of information society. Its intensive spread and turn into a paradigm can be implemented only by the improvement of adaptive skills (*Csatári – Kanalas,* 2002). Besides this – by referring to complexity – it is a key factor that accelerated technological changes, the spread of activities demanding a higher intensity of knowledge, the key role of ICT, the rapidly changing demands of labour market and the increasing need for cooperation are the major features of this new process (*Nyíri,* 2001). In sociological sense we can speak of such a model of social organization which uses a large quantity of and cheaply accessible information with much higher intensity in a wider sphere and applies much more effective data transfer technologies than the earlier ones (*Tamás,* 2001, 43).

2.1.3 Third wave

According to our theory the difference between the second and the third wave means that the management of information – as it builds adaptive skills – becomes more important than its access (*Sui,* 2000; *Lambooy,* 2000, 2002). This means a creative use of information which yields added value. Thus 'the skills of quickly finding relevant information creates competitive and cultural advantages' and 'the knowledge and group of skills authorizing for this are very important value making elements' (*Jeffrey,* 2003, 63). We are on the opinion that this demands the building and operation such complex socio-economic systems which can be described by using the theory of learning region and network models – pointing towards knowledge society.

Thus, we think that *the realization of the learning region concept can lead us to the implementation of the objectives of information society*. This means a kind of organizational learning (in this aspect it completely differs from the economic approaches based on individual decisions) and can be realized through the interaction of society, culture, legal norms and economic structures (*Kocsis – Szabó,* 2001, 14). Proceeding from this assumption its objective is strengthening – not primarily virtual – local communities, the improvement of living conditions both in economic and social aspects (Towards... 2000).

These processes are investigated by economic geography, regional science as well as economics (*Maskell* et al. 1998; *Storper,* 1995; *Hudson,* 1999). The analyses are focused on the research of knowledge and the features of its dissemination (*Giddens*, 2005). One of the starting points of the learning region is that the generation, transfer and use of information and knowledge as their product are not

constant so they demand continuous renewal from the different actors of learning (firms, regions) (*Szabó* [1999] emphasizes its evolutional character). Thus, producing non-material resources serving as the driving engine of economic growth (skills, know-how, working methods etc.) is not a single process it demands a continuous learning and knowledge updating process (*Maillat – Kebir,* 1999; *Lundvall – Johnson,* 1994). It is important that acquiring learning skills is indispensable not only for enterprises and R&D organizations but for economic structure, organizational forms and institutional systems as well (*Szabó,* 2004). It should also be mentioned that *unlike globalization decreasing the role of general territoriality, the dissemination of knowledge requires personal interactions which means that the role of localization will not decrease*.

Another basic element of the learning region concept is that economic development depends on innovation but innovation is determined by a continuous generation, dissemination and exploitation of knowledge. This latter can be regarded as a learning process which has a strong territorial determination) *Boekema* et al. 2000, 3). *Cooke* (2001) in this aspect considers learning region as a dynamic concept based on the extension of learning skills and knowledge base.

A very important element of the concept is that innovation-oriented regions may only be successful if they have appropriate organizational background and cooperativity. This means that its organizational patterns are different from the 'traditionally' developing regions (*Szathmáriné,* 2002). Their special feature is that the implementation of objectives is followed by a definite strategy and the organizational structure of planning and development is less hierarchical. Besides they can be characterized by the involving and consultative nature of organizational culture. They also can be characterized by the distinctive role of silent knowledge. It is strongly bound to the given social and cultural system which works only in neighbourhood relations (*Geenhuizen – Nijkamp,* 2000, *Lengyel*, 2004).

By *Asheim's* (1995, 2001) theory the emergence of learning regions brings about the transformation of industrial regions and the change of the economic structure. *Florida* (1995) is contrasting mass-product manufacturing region against learning region and differentiates them by linking production systems, by the knowledge worker based human resources, by the higher appreciation of the role of lifelong education, by the development level of communication infrastructure and by the global integration of the economy. Learning in this context is a local activity which has a significant historical embedment (*Asheim – Isaksen,* 2000). It is also important that learning regions may be formulated as a combination of collective political decisions and bottom-up initiatives (local communities, chambers, risk capital companies, educational and R&D institutions and municipalities) (*Isaksen, 2001*). Regarding this learning regions are functioning as collectors of ideas and knowledge and they provide the necessary conditions and infrastructure for the knowledge transfer and learning (*Florida,* 1995).

Learning regions as a whole can be regarded as a cognition process (*Capellin – Orsenigo,* 2006). The parameters of this cognition process are listed in *Table 1*.

The end of the cognition process is an area's transformation into a learning region. The success of this process is determined by several factors. Of them the major one is a consensus among local actors which because of the collective character of learning is important and in optimal case it is coupled by confidence and trust (*Morgan,* 1997). The networked character actively supporting the flow of knowledge is also important as well as the possibility of knowledge transformation (*Krackhardt – Hanson,* 1993). *According to our hypothesis the learning region model in Hungary is represented only by a few elements*. This is true even if knowledge regions (*Lengyel,* 2006) are meeting the necessary criteria in several aspects. Significant results have been achieved especially in the fields of governmental and market-based R&D, of demand-driven professional training and of the establishment of economic clusters. However the cooperation between market and non-profit actors is unambiguously weak which is coupled by negative residential attitudes. Our empirical research analyzed the features of the development process experienced in this field as well.

Table 1

Learning region as a cognition process

Elements of cognition process	The spatial parameters of cognition process
Types of external stimuli	The new demands of local 'market', demands for problem solving
Intensity of externel stimuli	Low cognitive distance, perception of 'weak signs'
Searching for coherences and integration and the adaptation process	Integration into local environment
Searching for additional resources of power	Metropolitan diversity and the satisfaction of special demands driven by industrial specialization
Interactive learning as a key of knowledge generation	Local networks
The outstanding role of institutions in knowledge generation	Values, norms, trust, local social capital

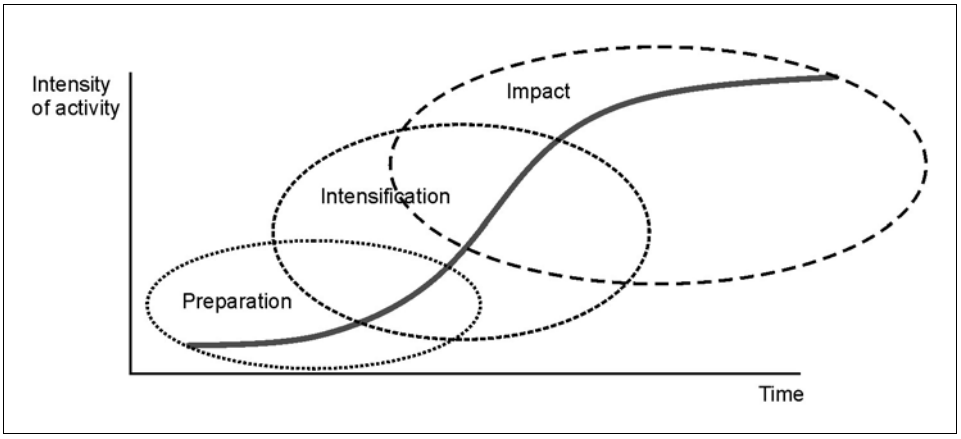
Source: Capellin – Orsenigo 2006.

2.2 What impacts can we expect?

On the basis of the above-described conceptual approaches *the possible socio-spatial impacts of IS can be defined by three key terms: ICT – inequalities – networks*. Our approach method is based on the life cycle and on the peculiarities of the development process of information society (*Figure 2*).

Figure 2

The life cycle of information society



Source: Sciadas, 2005.

Preparation as the lowest stage of development means the building of the infrastructural, professional political and regulatory background (in this chapter we are analysing the first stage only, all the others are described in details in a separate chapter). This development stage is characterized by a process where ICT lays down the foundations for building the information society and provides free and equal access to information (*Brachos* et al. 2005). This is followed by the period of intensification with wide-scaled utilization, application and content development. This is the period of increasing inequalities in several aspects which is preferably analysed by the theorists of the second wave of information society. These theories envisage certain social, economic and spatial dichotomies which verifies the fact that we cannot speak of a 'new society' but only of new type partial societies (*May,* 2002). These peculiarities will be demonstrated by the presentation of the characteristic features of inequalities with special regard to core-periphery relations, digital divide and the spatial relation systems of information society.

And finally we perceive the growing economic and spatial impacts of the process where a continuous adaptation turns into a key process (*Sciadas,* 2005). By our viewpoint the integral part of adaptive skills by shaping temporary or constant communities of interest and networks can be regarded as a new economic and social formation (among others *Maskell* et al. 1999; *Castells,* 2001; *Butt,* 2004; *Malecki,* 2002).

2.2.1 Inequalities in the information society

One of the key issues of the scientific discourse led on information society is whether information will be accessible for everyone regardless to geographical position and social status or it will rather increase socio-spatial disparities and generate a new type of inequalities.

The international deconcentration theories of information society (first wave) anticipated decreasing traditional spatial differences and geographical determinations (*Masuda,* 1988; *McLuhan,* 2001). A similar future was depicted in the EU's plans of development policy (*EU 1994 – Bangemann Report*) prognostifying the realization of digital democracy. In relationship with this approach with the opportunity of transferring information, products and services through electronic networks the issue of the elimination of distance was raised (*Caincross,* 1997) or the end of geography as a development trend (*Gillespie* et al. 2001). By this interpretation the new processes create an opportunity for a quick closing up. On the whole these approaches started from the assumption that a decreasing gap can be expected in the traditional dimension of territorial inequalities (such as between metropolitan and rural areas) within the information society and hoped the activization of peripheries (such as the structural regeneration of industrial crisis regions) from the new processes (*Erdősi,* 1999).

But in contrast to these expectations *in the present phase of development social cohesion or isolation cannot significantly be influenced by the development of information technologies alone, as it depends on the stage of social development as well* (*Castells,* 2005). This means that the development of information technologies cannot facilitate regional development alone because it is influenced by the recipients' activity, the educational and research background and the economic milieu as well (*Cornfold,* 2000). This approach is supported by another opinion stating that the elimination of physical distance does not devaluate the role of space, yet on the contrary the less obstacles arise from physical distance the greater importance is attached to the other features of spatial locations and this will re-evaluate comparative advantages (*Rechnitzer,* 2003).[4] Castells and Jacobs

[4] By these judgements ICT plays a catalysing role only which means it is reinforcing 'traditional' processes.

are also pointing out that an area is unable for preserving its competitiveness without an efficient utilization of its own resources (*Castells – Hall,* 1994).

For us Castells' interpretation visioning a radical polarization of social processes within his idea of dual society seems to be the most acceptable. His theory elaborated principally for metropolitan areas is built on several levels of polarization. It comprises the levels of access-utilization, of necessary skills and of the types of labour. Another part of the current researches considers differences in economic development as the primary reason of rising inequalities on macro-level (*Hargittai,* 1999; *Rodriguez – Wilson,* 2000; OECD 2001).

Inequalities by Castells and other authors can be interpreted in several dimensions. Exclusion is the mostly typical phenomenon amongst the unemployed, the rural, the unskilled, the old generation, the refugees, the minorities and the handicapped (*Donelly,* 2000). However in this question we rather agree with Pippa Norris (2001) who considers income, age, sex and education as further differentiating factors. We also consider geographical location a primary factor of differentiation including the core-periphery and city-village divide (e-Inclusion 2001). Hungarian researches produce similar results. Gender-based differentiation has no significance both in the intensity of knowledge and the time spent for learning (*Lengyel,* 2003). However settlement type, education level, age and the number of children are very significant differentiating factors (*Csepeli – Prazsák,* 2003). In Hungary besides the above-listed ones social restructuring following the regime change and the emerging structural divide are also substantial factors of increasing growing inequalities. Its major element is that underclass has been excluded from the institutional facilities of the acquisition of knowledge (*Gazsó,* 2001). Béla Beszteri – as an addition to these thoughts – calls attention for the contradictions of the new processes. He emphasizes that information society is one of the most (in a positive way) fundamental processes changing both the global society and economy of the 21st century but it has not only winners but also losers. By his theory treating education and culture as 'investments' is one of the major resources of problem (*Beszteri,* 2002). We assume that these factors generate a multi-level hierarchy of inequality system (core-periphery relationship, digital divide).

In Hungarian scientific literature – although opinions are differing concerning whether the spatial structure of information society can turn to be a changing factor (*Erdősi,* 1990, 1991; *Rechnitzer,* 1993, 2000; *Nagy,* 2002; *Teller,* 2000) – It is generally approved in literature that *in Hungary this process is taking place at all the levels of the spatial hierarchy*. Its major benefactors are cities, metropolitan areas and medium-sized cities with a significant higher education system, diversified industrial structure and advanced public services (*Gillespie – Robins,* 1989; *Nagy,* 2002). This is verified by the fact that knowledge-based industries are also tightly bound to such social surplus which others cannot achieve else-

where (*Bod,* 2000). Another evidence for this hypothesis is that advanced business services are favouring urban or rather metropolitan areas in their site selection policy and this will clearly result in a long-term preservation of spatial disparities (*Raffay*, 2004).

Starting from the above described macro-level processes – for the sake of defining inequalities – this chapter is going to provide a detailed definition of the present spatial dichotomies, it discusses the interpretations of digital divide and presents the new types of core-periphery relations.

2.2.2.1 Spatial relation systems in the information society

The complexity of inequalities by our opinion can be described by three pairs of concept. They are global and local, polarization and integration and concentration and deconcentration.

Globalization and localization

Some researches in the global-local discourse are opposing the two processes and consider localization as a kind of response, counter action (*Robertson* 1995, *Beszteri* 2001, 6–7). On the grounds of our research experiences we cannot approve this theory; we rather believe that *the two processes are following rather an analogue pathway*. Globalization is not only something coming from outside forcing its will onto local players assuming a passive way of behaviour of the local players but it is rather a historically changing process based on the interaction of global and local mechanisms, on the bilateral relationship and communication of global and local actors (*Szirmai* et al. 2002a). Thus, it is very important that globalization involves the reinforcement of local processes as well (*Rechnitzer,* 2003; *Tóth,* 2004). The higher appreciation of localities increases mostly the importance of small communities and favours the strategy of bottom to top schemed composition (*Nagy,* 2004).

The above described phenomenon named as glocalization in scientific literature is very typical in the present development stage of information society (*Varga* [2004] uses the terminology of globlocal world). The term of glocalization in general sense means that the autonomy of sub-systems may be worth for preserving because they are worth more if they own some independence. (*The Glocalization...* 2004). Castells points out the correlation between global and local aspects from another viewpoint (*Castells,* 2005). He underlines that organizations are localized but organizational logic is independent from space and it is implemented within the space of flows. This is matching with the theory saying that an area's innovative performance depends on the amount of the actors' knowledge and on the flow among them (*Horváth,* 2004).

The partially differing from the above described global-local relationship emerging in the context of regional economy is starting from the point that – predominantly due to – the spread of ICT theoretically any kind of economic activities can be performed at any place. However this is true in theoretical aspect only because the localization aspects of economic actors are more bound to the possible competitive advantages they may yield but their availability is not homogenous in space (*Lengyel – Rechnitzer,* 2005). For this reason the role of local embedment is highly appreciated in preserving competitive advantages and localization becomes a definitive process for globalization driven transforming economies (*Lengyel,* 2003).

And finally the duality of global-local can also be identified in the Hungarian urban network. Our researches (*Szirmai* et al. 2001, Szirmai et al. 2002b) pointed out that Hungarian cities represent global processes and their representation and integration demands are in accordance with those of general globalization. For example the cities of Székesfehérvár, Győr, Tatabánya and Budapest are rather more local than global societies or cities (*Szirmai* et al. 2003).

Table 2 is demonstrating the correlating features between the features of globalization and localization on the basis of the above described aspects.

Table 2

The correlation between global and local in information society

Global	Local
Globalising market competition (global strategies)	The preservation of differences in economic performance
A theoretically unlimited abundance of the traditional factors of production	The 'domestic basis' of global companies can be identified, cities are the carriers of local values
Globally spreading new ideas	The key branches of leading firms are concentrated while the production and servicing units are located in peripheries
Global technology	Local communities and content
Global development strategies	Bottom-up composition
Spread of global culture	Local movements
Organisational culture is formulated on global level	Organizations are bound to locations
Globalizing economy	Local society

Source: The author's own edition on the basis of Lengyel – Rechnitzer (2005).

Our viewpoint is that the symbiosis of global with local can be interpreted in information society in narrow and wide sense as well. In narrow sense (by a simplified approach) it can be identified by the terminology pair of technology and

adaptation (services, communities, content). In wider sense (following the two authors' Lengyel–Rechnitzer theory) it means the duality of market competition, production factors, knowledge, technology development policy on the one side and the evolutional process of organization systems on the other side.

Polarization and standardization

The meaning of polarization and standardization terminology pair is partly differing from this. Its essence is that besides the polarization of the processes of economy and living standards there are significant spatial differences in ICT access and use. They are most clearly manifested between core and peripheral areas (regions) and between cities and villages (*Erdősi,* 2004). This is explained by the fact that *information society related activities are concentrated in the core areas of development* (*Rechnitzer,* 2003, 2004; *Szirmai,* 2004; *Nemes Nagy,* 2003; *Cornford,* 2000) and only some regions are capable alone for exploiting their new comparative advantages.

For the explanation of the terminology pairs it is necessary to remark that while polarization creates significant, even spatially palpable differences standardization can rather be regarded as a sectoral factor or even works against polarization.

Concentration and deconcentration

The spread of information society brings on both concentrating and deconcentrating impacts. One of its elements is that its spatial diffusion is closely correlated with the spatial concentration of innovation (*Cooke,* 2001). *Concentration areas are absorbing central knowledge spaces such as universities, R&D organizations, innovative enterprises, specialized information and organizational networks* (*Cooke,* 1999; *Maskell* et al. 1998; *Asheim,* 1995; *Maillat – Kebir,* 1999). Another phenomenon of concentration is that metropolises play an increasing role in urban systems strongly affecting the site selection policy of industrial and servicing sectors (*Castells,* 2001). *Graham* (2000) has a similar argumentation on it. By this approach the higher appreciation of cities stems from several motives. On the one hand ICT is tailored to the existing high added value activities. On the other hand for minimizing economic risks ICT favours settlements with an adequate innovation milieu.

The spread of information society as a deconcentration process decreases traditional competitive advantages which may enable the closing up of economically peripheral areas (*Fuchs – Wolf,* 2000). But contrarily some researches (*Gillespie – Robins,* 1989; *Preston,* 1995) report on just the strengthening of concentration processes and indicate deconcentration effects in case of fundamental technologies only. Concentration is clearly noticeable in decision-making processes (*Szirmai,* 2004) or in case of changes in the quality of life. But it often brings about a

decline in the position of less advanced regions. On technologically underdeveloped peripheral areas a kind of 'networked ghettos' are formulated (*Thrift,* 1994).

Imre Lengyel in connection with the spread of ICT highlights the simultaneous phenomena of concentration and deconcentration. In accordance to his theory the deconcentration of executive activities is accompanied by a definite concentration of strategic activities (*Lengyel,* 2003). This can principally be manifested within the framework of agglomeration economies. This is accompanied by such positive externalities as (building of infrastructure, sectoral concentration, specialization) that are further strengthening – primarily – economic concentrations (*Fujita* et al., 1999; *Lengyel,* 2003). In Porter's interpretation agglomeration economies and development poles are mingled and clusterization becomes the primary factor of development (*Porter,* 1990). All these theories are common in stating that certain spatial nodes have stronger social and economic relations.

2.2.2.2 Digital divide

Digital gap, digital divide and digital inequalities are all new terminologies born during the past ten years. *When the penetration rate of ICT devices was low they were used as a category of access to devices.* To this refers also an OECD definition formulated in 2001. It says digital divide is a difference in access between individuals, households, economic and geographic areas having been determined by different social and economic factors.

But today this term has been used in a more complex sense describing the different quantitative and qualitative parameters of usage (*DiMaggio – Hargittai,* 2001; *Dányi* 2003). The use of this term in case of several authors just because of the changes in its meaning tends to mark inequalities (*DiMaggio – Hargittai,* 2001; *Hargittai,* 2003; *Szarvák,* 2006; Spanning… 2001). This kind of approach uses this term in a wider sense taking several dimensions of technological access and utilization into consideration. Thus *it is setting up the quality of devices, the autonomy of utilization (the place of access, the freedom of utilization), the establishment of social networks (size, mutual help) and online skills as new criteria. It is also an important element that not the presence or the absence of access is focused in analyses but rather the behavioural patterns of actors having access to it and they analyse the social differences they are arising from* (*Wilson,* 1999; *Norris,* 2001). Some of our empirical researches are fitting into this line of thoughts but they are analysing them by a particular set of criteria only.[5]

[5] This means that due to its social geographic orientation it investigates the correlations between territorial (local, settlement network and regional level) aspects and social factors. However it does not intend to provide an investigation and evaluation on the inequalities of micro-communities and the social spaces they are embedded into. For all that we are striving to utilize all the – mostly

When specifying the meaning of the term digital divide we cannot neglect that acquiring digital literacy less and less counts as a 'competition advantage'. At the current social development phase it is rather an expectation. *The groups excluded from ICT will be left out of a certain part of public services and may get into a marginal position on labour market or in public life* (*Alföldi,* 2006). We are on the opinion that at the current state of development the integration and support of this kind of peripherized social groups is not possible. For them the access to even the most common and essential public services will be more problematic such as financial, public health, governmental services including education as well (*Hargittai,* 2003).

In Hungary digital divide evolved and was growing since the second half of the 1990s with the growing number of home personal computers and with Internet access (A magyar társadalom… 2004). The present processes seem to indicate the stabilization of the digital divide in the present society (today 60–70% of the present society are not or under motivated for an active participation). The differentiating factors – following the international trends – are arising from differences in sex, ethnic background, educational level, age or income (WIR, 2005, *Dessewffy,* 2003). Beyond them the differentiating impacts of geographical location are manifested even by differences in the access to basic technical facilities. The central places of settlement hierarchy enjoy a far better provision of services than rural areas. This means that the conservation of traditional urban-rural social and economic dependencies is a major source of digital divides (A detailed description of the digital inequalities and their factors in Hungary will be discussed later. Here we only find important to remark that in Hungary there is a strong correlation between digital divide and social capital. Users definitely have higher sociability index than the excluded [*Molnár,* 2003]).

Finally it is important to notice *that researches on digital divide are common in that aspect that they all raise the question whether digital divide increases the existing differences or creates a new system of inequalities*. This may fundamentally change the application mode of intervention policies as well (*Pintér,* 2003; *Szarvák,* 2004).

2.2.2.3 Core-periphery relations

According to Krugman (*Krugman,* 2000) core-periphery relations are originating from the duality of mobile and static resources. Concerning the dual concept of core-periphery *Nemes Nagy József* (1996) defines three associated meanings of it.

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sociological – approaches attached to this subject for our research. From this aspect we are particularly interested in the relevant works of Tamás Pál (2001), Utasi Ágnes (2002), and Szarvák Tibor (2006).

The first one is locational or geographical duality denoting core or periphery position in geographical sense. In case of developmental core-periphery we can oppose the conceptual meanings of developed and underdeveloped. The third is a power-oriented aspect describing differences in dependence and assertion. Nemes Nagy highlights the complexity of core-periphery relations and emphasizes the relativity of the concept. The core-periphery approach of Lengyel–Rechnitzer is slightly differing from this by focusing on the spatial concentration of innovations. They are specifying areas with high concentration of innovation as cores and all the others as peripheries. They also remark that cores and peripheries are in dependency relation with each other (*Lengyel – Rechnitzer,* 2005, 289). The primary elements of dependency are organizational, power and institutional aspects which are important factors of the spread of IS as well. On the basis of Friedmann's theory the two authors also underline that peripheries also should mobilize their own resources for tackling their handicapped position.

In Hungarian literature we also can see a multi-level approach of core and periphery relations. On the one hand the theory of concentration taking place simultaneously with the deconcentrated pattern of the spread of information society (*Erdősi,* 2002) is the first sign of it. On the other hand (not directly connected with the information society) it is also experienced in Hungarian metropolitan areas as a special differentiated form of urban social formations (*Szirmai,* 2006). This latter approach refers to the fact that in metropolitan areas the traditional core-periphery hierarchy of socially low-ranked core and high-ranked periphery elements.

It is worth noting that *the evolution of information society is also fostering the changing of core-periphery relations* (*Farkas,* 2003). IS can also characterized by the feature that peripheries are in much worse situation from the aspect that the implementation or negligence of fundamental technology development projects strongly depends on market-oriented considerations (*Kanalas,* 2000). It is also significant that core-periphery relations – for the greater part in metropolitan areas – are perceived within the boundaries of a single settlement as well. Here we can find typical internal ruptures and core-periphery effects as well (*Nagy,* 2004). The core-periphery relations between places (or regions) may also be explored by such factors as the development stage of innovation and adaptive skills, the predominance of the interests of the core area and the existence of essential facilities.

In literature there are also some approaches stating that the application of ICT can assist to closing up peripheries by fostering enterprises, improving employment and lifting communities (*Hughes,* 2004). However it works under the condition if all the basic components of information society are improved because this is the only way of building integrative communities. The fact that some parameters of the peripheries have such potentials that may diminish the disadvantages of peripheral position may work for this process (*G. Fekete,* 2005). This is especially

true in case of the emerging new key factors – cooperation, partnership, solidarity and uniqueness – of development. The latter elements may secure a free crossover between traditional assemblages and – yet now a smaller circle of – virtual communities.[6]

On the basis of the aforementioned approaches the social and spatial disparities of information society can be understood as a complex multi-dimensional system. By our opinion *these conceptual definitions suggest that the key mechanism can be integrated into two strongly correlating factor sets*. By this approach we are on the opinion that *all factors that a certain territorial unit has no or very little impact on are defined as external factors*. *All that are the outcomes of their own spatial and social background are defined as internal*. By our approach the two sets mutually contribute to the increase of socio-spatial inequalities and also shaping their character (*Figure 3*).

We also find important that a changing balance between the two factors sets changes the characteristics of inequalities as well. In case of external factor dominance dependence while in case of internal factor dominance the scarcity of resources are overweighing all the other factors.

2.3 How can the outcomes be characterized?

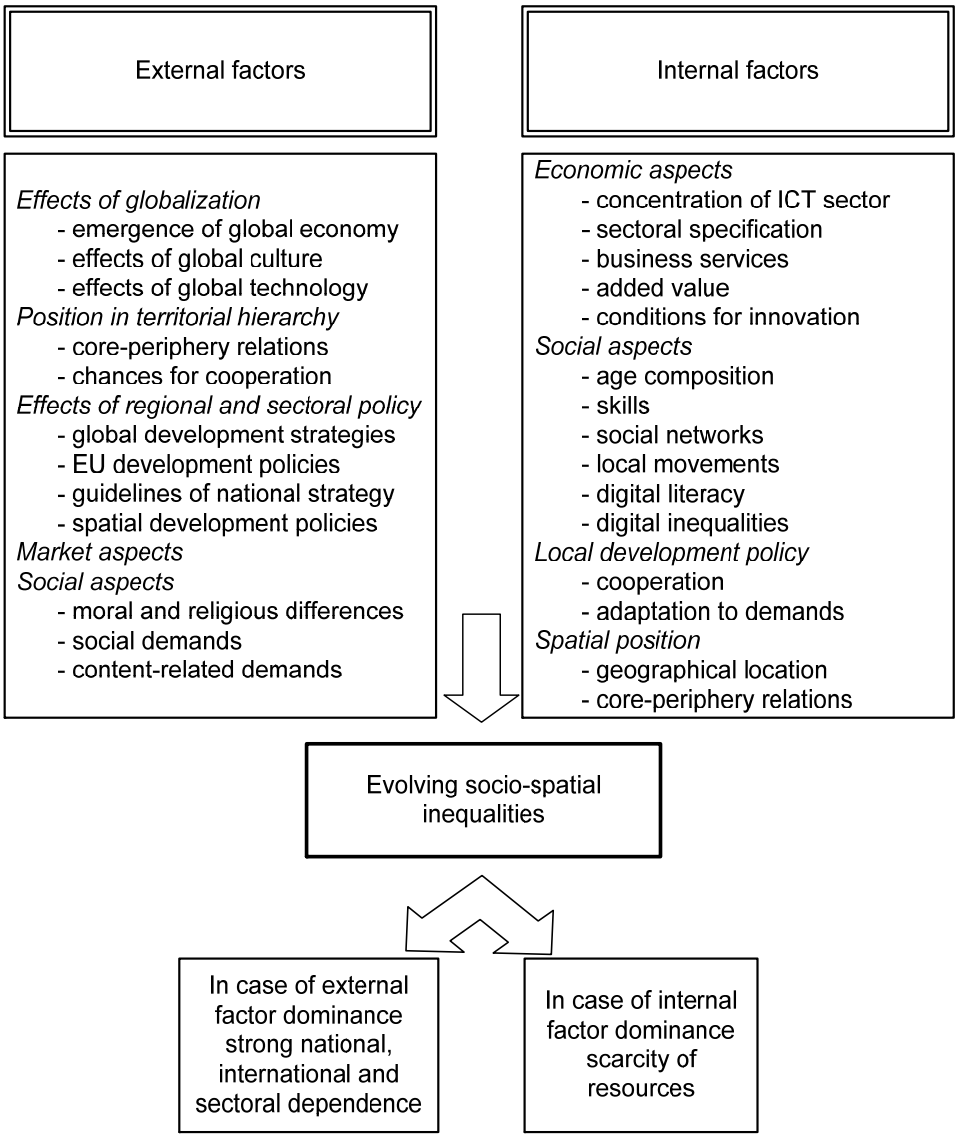
The aforesaid impacts of information society may be identified on several levels and their outcomes are rather complex. The complexity of the process is indicated by the fact that several macro-level approaches have been set up for the implementation of the information society. *Castells and Himanen* (2002) separate three different social models. The first is the Silicon Valley model which is a market regulated and an open way towards information society. The second is the Singapore model flavoured by strong state interventions. And finally the Finnish model is differing from them by showing a way to an open welfare information society.

The Silicon Valley named North American way of IS is featured by the emergence of quick and extensive ICT innovations and by the rationalization of the telecommunication sector. The Southern Asian model to the contrary is dominated by social aspects and by bottom to top approaches. And finally the West-European development model is unique just in its diversity by integrating various elements from all the other models (*Csorba,* 2005, A világ… 2004).

[6] A series of analyses on the correlations between geographical and cyberspace are trying to find a solution just for this problem (*Mészáros,* 2003; *György,* 2001; *Jordan* 1999).

Figure 3

The major factors of inequalities



Source: The author's own edition.

The European development model is based on two sets of principles. The first is the political and social environment (including education and training), the other is the public institutional system (including information supply, the preparation of strategies) [*Csorba,* 2005, 2].

Irrespectively from development models the evolution of information society is influenced by five territorial and geographical aspects. The first is the geographical determination of human developments (and their cognitive, social, cultural and economic consequences). The second is geographical proximity having a determining role in personal contacts. The third is geographical and social contacts influencing silent knowledge. The next is learning which can be studied in special economic and social context. And finally, it is also important that the filtering and utilization of information also involve geographic determination (*Howells,* 2002, 873–874).

The differing development models mark different development courses for each country. In addition to this development differences are showing strong national level and functional determination as well. This is pointed out by an opinion saying that 'knowledge infrastructure' i.e. knowledge intensive services and the utilization of ICT are definitely concentrated in metropolitan centres (*Sassen,* 2001; *Richardson – Bae,* 2006). Thus, on local level knowledge sharing and geographic proximity based clusters enabling the transfer of silent knowledge are rather more the driving forces (e.g.: Silicon Valley, Sophia Antipolis, Tsukuba).

Because of the aforesaid factors the competitive advantages of cities are re-evaluated. This is due to the fact that the development of information and communication networks makes possible the relocation of several labour intensive activities into developing countries (*Lever,* 2002). The fading of earlier competitive advantages urges cities to redefine their activities and cooperation strategies. The most generally approved competitive advantage may be the more efficient utilization of knowledge base as the successful utilization of knowledge may foster the spread of the innovation of products, services and activities (*Lambooy,* 2000; *Castells – Hall,* 1994). It should stand on the increase of R&D investments, on increasing labour skills and on application development.

On the whole it is also important that the evolution of information society implies the increase of its spatial impacts. Its major outcomes are as follows:

- Flexibility, the presence or absence of quick response;
- The growth or stagnation of ICT investments;
- The growth or stagnation of some non-material investments (education, R&D, consultation, etc.);
- The presence or absence of R&D cooperation;
- Foreign direct investments;
- The presence or absence of applicable R&D capacities in short-term;

– The introduction of new decision-making procedures;
– The presence or absence of mechanisms where innovations are stimulated by consumer demands (*Nyíri,* 2001);

3 What can be seen from our empirical results?

We carried out our empirical research by taking all the important results of the theoretical foundations into account. We did so to assess the present development stage of the information society and its impact on regional development. Our empirical researches were carried out in the metropolitan areas of Hungary and in Central Transdanubian Region. In the next chapter we are going to outline the major results of our studies.

3.1 How are the Hungarian micro regions progressing?

3.1.1 The objective of the partial analysis

Although a wide range of comprehensive research results is available on the progress of regional processes and on the factors of economic and social development no complex researches have been carried out on the impacts of information society on local level. The so far prepared analyses on the features of (preferably economic) spatial structure are limited only to the characteristic features of ICT, therefore they are favouring mostly technology oriented aspects (*Erdősi,* 1999; *Nagy,* 1997; *Kanalas,* 2000) and some analyses are focusing on the role of cities and counties within the spatial structure (*Rechnitzer* et al. 2003, *Nagy,* 2002).

By proceeding from this standpoint *our investigation is aimed at revealing how the Hungarian micro regions*[7] *are trying to adapt to the paradigm of social organization comprising the investigated complex technological, economic and social aspects as well. Our research has double objectives. On the one hand we are trying to find out what indices can be used for describing spatial development. On the other hand we are going to analyse how the factors of IS affect regional development and how they influence spatial disparities.*

[7] A The Hungarian Central Statistical Office assigned statistical microregions in 1993 for the first time. At that time 138 microregions covered the country's whole territory. As some microregions had multiple centres their number increased to 150 in 1997. Due to the quickly increasing number of new towns and to the expansion of their settlement functions the number of microregions further increased in 2004 and their current number is 168. Our paper's analyses cover provincial microregions (excluding Budapest). The microregions of Budapest were excluded from our research due to their much higher – in all kinds of aspects – development indices.

Beyond these our partial analysis is motivated by two further reasons. The first is that the traditional infrastructure – ICT economy – education approach is not complex enough and suitable for introducing certain elements of IS only. Our approach is going to go further than this viewpoint. On the other hand our applied multivariable statistical methods (factor and cluster analysis) make us possible the categorization of the elements of the territorial level of our research area i.e. to define the various types of developmental stages and to present their characteristic features.

3.1.2 Methodological background

Fort he establishment of the variable sets to analyze we surveyed the indices of the complex development level of micro regions (and partially of the integration into the information society) with the standard international indices measuring the development level of the information society (*Csatári,* 1996; *Beluszky,* 2001; *Faluvégi,* 2004; *Nemes Nagy,* 1996; *Rechnitzer,* 2003, 2004; *Baranyi,* 2004; *Nagy,* 2003; *Kanalas,* 2000 and Word Bank, eEurope Benchmarking, CID, ISI, ITU, Orbicom, NRI).

We used 47 different base variables for the analysis of Hungarian micro regions. Some of the selected variables were used for analysing the development level of ICT (i.e. technological supply level), some for assessing human resources, some for analysing employment structure and another part for describing the relevant economic environment. Our complex approach required to use such a system of indices which was not directly linked to IS but had such variables which were in close relationship with it.

When carrying out the multivariable statistical analysis we used static variables only and we were not striving for the exploration of the timely changes of processes. The main reason why we did so is that for the majority of variables used in the index system we had no opportunities to compare the data collected at different times and the mixture of static and dynamic variables would have reduced the efficiency of the research method applied. The majority of data are taken from KSH T-STAR database and with only one exception (census data) they are from year 2005. Another part of the data was taken by own collection (the date of data collection was August 2006). The base variables are summarized in *Table 3*.

Table 3

The base variables of the complex index system

Variable	Year	Source
Number of accredited faculties of higher education	2006	MAB
Activity ratio, %	2005	KSH T-STAR
Number of permanent residents, heads	2005	KSH T-STAR
Number of primary school pupils, head/100 residents	2005	KSH T-STAR
Number of banks	2006	own collection
Number of registered patents	2006	PIPACS
Number of civil federation member organizations	2006	ITOSZ, WISTA, MATISZ
Number of doctoral schools	2006	MAB
Personal income tax per head, HUF	2005	KSH T-STAR
Number of University IS research units	2006	ITTK
Number of university professors	2005	KSH T-STAR
Number of higher education centres	2006	NFI
Ratio of graduated employees, %	2005	KSH T-STAR
Ratio of graduated persons, %	2001	KSH T-STAR
Number of technical university and college departments	2006	MAB
Sum of grants won by GVOP 3 competitions, million HUF	2006	NFH
Sum of grants won by GVOP 4 competitions, million HUF	2006	NFH
Number of local radio stations	2006	Médiaász
Number of local television stations	2006	Médiaász
Number of local newspapers	2006	Médiaász
Number of ICT servicing enterprises	2005	KSH CégKódTár
Number if productive ICT enterprises	2005	KSH CégKódTár
Number if secondary schools providing IT training	2006	OKÉV
Number of incubator houses	2006	MISZ
Number of innovation federation member organizations	2006	MISZ
Number of industrial parks	2006	GKM
Number of ITOK (Information Society Education & Research Groups) research units	2006	ITTK
Number of IVSZ (Hungarian Association of IT Companies) members	2006	IVSZ
Number of R&D enterprises	2005	KSH CégKódTár
Degree of cable TV provision, %	2005	KSH T-STAR
Number of correspondent university students	2005	KSH T-STAR
Number of modem Internet service providers	2006	own collection
Number of research units funded or supported by HAS	2006	MTA
Unemployment rate, %	2005	KSH T-STAR
Number of full-time university students, heads	2005	KSH T-STAR
Accessibility ratio to open WIFI connections, %	2006	hotspotter.hu

Count. Table 3

Variable	Year	Source
Ratio of career-starter unemployment, %	2005	KSH T-STAR
Number of registered domain names	2004	ISZT*
Participation at Parliamentary Elections, %	2006	OVI
Number of secondary schools providing special language training	2006	OKÉV
Number of broadband Internet service providers	2006	own collection
Sum of Corporation Tax, thousand HUF per inhabitant	2003	APEH
Ratio of long-term unemployed people, %	2005	KSH T-STAR
Number of tele-houses	2006	MTSZ
Fixed phone provision ratio, %	2005	KSH T-STAR
Ratio of employees in managerial position, %	2005	KSH T-STAR
Number of web references	2006	www.google.hu

***** The micro regional database was prepared on the basis of ISZT (Council of Hungarian Internet Providers) data by I. Kanalas (CRS HAS ARG).
Source: The author's own edition.

In accordance with the objectives of the partial research *in the first step we are going to select those variables that best represent the development of IS and to replace the great number of available variables with a less number of factor variables preserving the greatest part of their information content*. To achieve this we selected factor analysis and namely the method of main component analysis. Having learnt the statistical background of factor analysis we used a correlation matrix first for investigating the interconnection of single data. As the value of Kaiser-Meyer-Olkin index was nearly 0.9 (0.874 actually), the information carried by 47 variables was suitable for executing factor analysis. Based on the results of main component analysis (having gained after rotations) the values of four factors exceeded the value of 1. These four factors explain 81.23% of the original information content which means that the base variables may represent the disparities and uneven development level between micro regions with minor information content loss. It should also be noted that of the 47 base variables on the basis of factor analysis we cannot consider all of them as component parts of these factors. Variables with cumulating value below 0.25 or not linked to any factors were excluded from further analyses.[8] Considering this the variables bound to each factor (38 in total) and their factor values are as follows (*Table 4*):

[8] The linkage of such factors is unambigous where factor weight exceeds the value of .025 in a single factor only or its factor weight on one factor is at least double of any other factors (*Székelyi – Barna,* 2002).

Table 4

The value of variables bound to the four factors and the values of factor weights

Variable	Weight of factor
Factor 1: economic performance, motivation force: 56.62%	
Number of research units funded or supported by HAS	.991
Number of ICT servicing enterprises	.989
Number of registered patents	.988
Number of R&D enterprises	.987
Permanent population (heads)	.983
Number of productive ICT enterprises	.979
Number of ITOK (Information Society Education & Research Groups) research units	.947
Number of banks	.876
Number of university IS research units	.664
Number of incubator houses	.506
Factor 2: Social maturity, motivation force: 11.48%	
Number of university professors	.961
Number of university students (heads per 1000 inhabitants)	.960
Number of accredited college/university faculties	.955
Number accredited institutes of adult education	.934
Number of doctoral schools	.919
Unemployment rate (%)	.902
Ratio of long-term unemployed people (%)	.895
Number of technical universities and colleges	.879
Ratio of graduated employees (%)	.844
Ratio of employees in managerial position (%)	.818
Number of elementary school pupils (heads /100 inhabitants)	.765
Activity ratio (%)	.751
Number of secondary schools providing IT training	.549
Number of secondary schools providing special language training	.540
Factor 3: technological development, motivation force: 9.49%	
Number of modem Internet service providers	.949
Number of broadband Internet service providers	.897
Fixed phone service provision ratio (%)	.580
Accessibility ratio to open WIFI connection in settlements (%)	.496
Factor 4: content and activity, motivation force: 3.64%	
Number of IVSZ (Hungarian Association of IT Companies) members	.993
Number of registered domain names	.992
Number of civil federation member organizations	.990

Count. Table 4

Variable	Weight of factor
Number of Innovation federation member organizations	.986
Sum of grants won by GVOP 3 competitions, million HUF	.982
Sum of grants won by GVOP 4 competitions, million HUF	.891
Number of local television channels	.848
Number of local newspapers	.749
Web references	.692
Number of local radio stations	.649

Source: The author's own calculation.

We arranged micro regions into groups by these four factors by applying the K-mean cluster analysis method. For maximizing the homogeneity of groups we carried out cluster analysis by selecting 3, 4, 5 and then 7 clusters. Based on the results we got *micro regional level development differences and spatial disparities can be identified by four clusters the most exactly.* Of course some micro regions – due to the relatively small number of clusters are located remotely from their cluster centres being in a kind of transitional position between their and their neighbour cluster (such as the micro regions of Székesfehérvár, Aba, or Budaörs). Our analysis is calling special attention for them.

3.1.3 Some major results

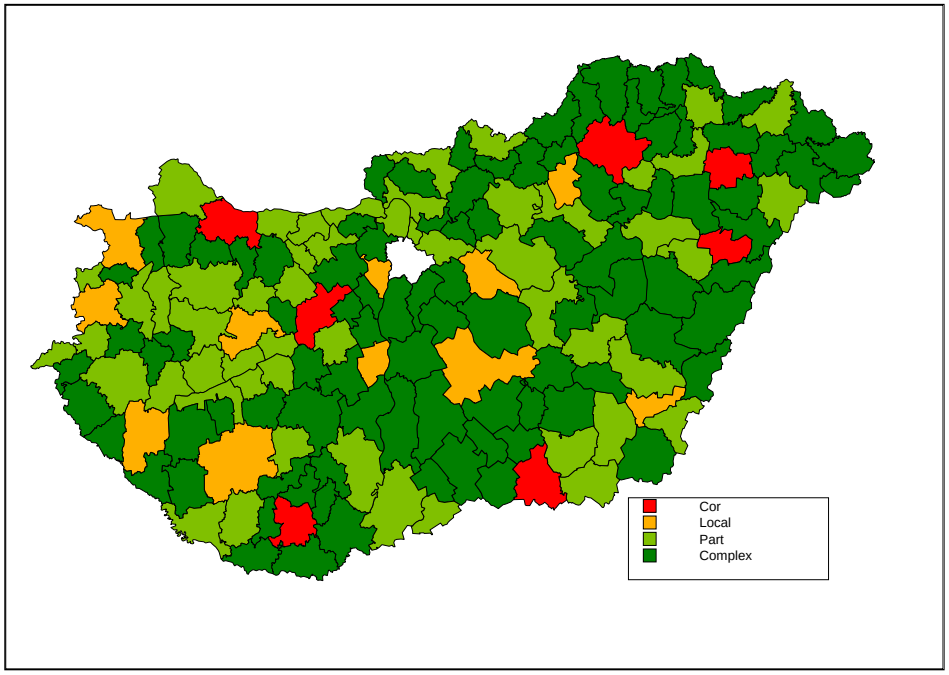
The results of the earlier researches on the spatial processes of information society are clearly outlining the major trends of disparities. Budapest and the metropolitan areas have by far the highest values of development indicators. Both settlement size and the spatial concentration of higher education and R&D are correlating with the development differences of the information society. The analysed surveys (*Nagy,* 2004) are also highlighting the primacy of infrastructural development over general spatial development which is further differentiated by consumer markets. The concentration of potential users is another major factor which is dependant on income and employment parameters. In this aspect Budapest and its agglomeration with Győr-Moson-Sopron, Vas and Fejér counties have the best values. Besides these components higher education and R&D background are also fostering companies for creating new jobs.

The complex indexing system and the four factors provide a clear picture on the development level and on the spatial disparities of the Hungarian micro regions. In their major trends they are matching with the results of earlier researches but in some cases they are outlining new trend as well. On the basis of

the results of cluster analysis *Figure 4* shows the spatial location of micro regions tied to the same cluster.

Figure 4

The potential information society groups of Hungarian micro regions based on a complex indicator system, 2006



Source: The author's own calculation and edition.

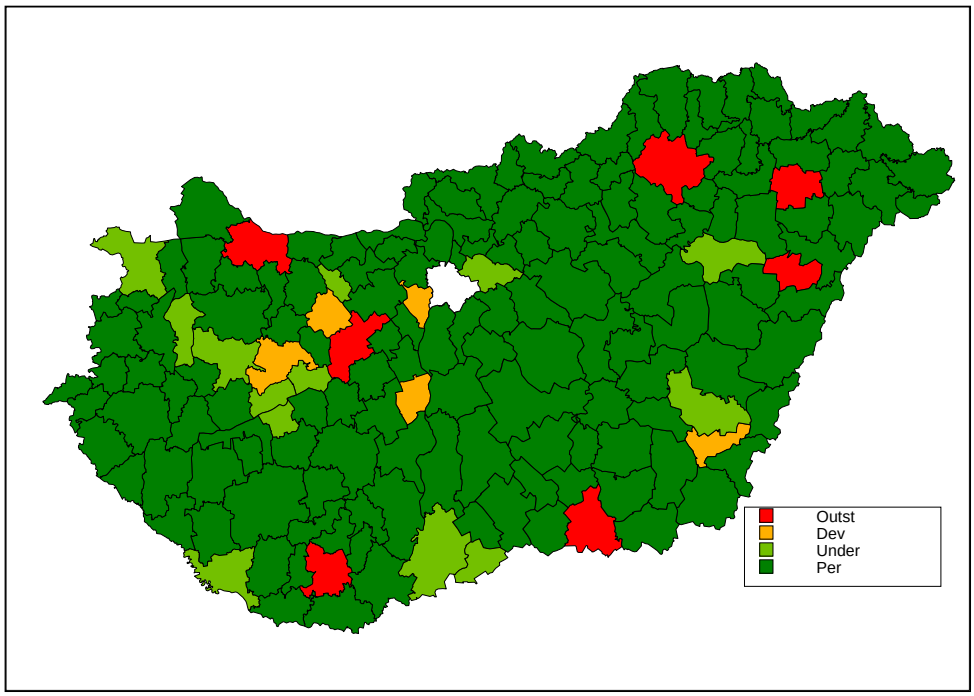
The group of the economically most advanced micro regions, *the centres of IS,* consists of seven micro regions. They without exception have been formed around big cities (of all Hungarian big cities Kecskemét is the only one excluding from this group[9]). *The members of the group are definitely differing from other micro regions*. They are common in their extraordinarily high level of economic development, social maturity, technological development as well as content and activity background. The high concentration of ICT enterprises (both manufacturing and servicing) is special for this group which refers to the fact that enter-

[9] We must note that the development level of microregions in case of cluster 1 and 2 reflects the central role of their cities (all but one they are cities of county rank). This is because the index group has several variables that are valid for cities with county rank. This also highlights the fact that in the present stage of development complex IS integration is the privilege of centres only.

prises are favouring the proximity of big cities with regional functions in their site selection policy. This is verified by the groups arranged by the variables of factor 1 (*Figure 5*).

Figure 5

The possible grouping of Hungarian micro regions based on the data of factor 1, 2006



Source: The author's own calculation and edition

We must emphasize that *factors play a different role in the development level of IS and because of this they can be arranged into three sub-groups*. One sub-group of the cluster consists of the micro regions of Debrecen, Miskolc, Pécs and Szeged. Because of their positive declination from cluster centre they are the ones that regarded as cluster centres. They are common in having the most advanced ICT sector coupled by a highly advanced higher education system and R&D capacities. Their traditional role as higher education centres even with a relatively less advanced ICT sector is securing a high degree of IS integration. This even in

case of highly advanced IS is backing up the hypothesis that *the density nodes of the spatial structure as a result of the preceding and following years of the regime change are functioning as classical regional centres*. *The other part of cluster consists of the micro regions of Győr and Székesfehérvár the most successful territories of the socio-economic transformation process following the political changes of the 1990s. In their case we can speak of unilateral development only*. Their economic development is unambiguously outstanding and it is noticeable by the high number of manufacturing and servicing ICT enterprises and by the high concentration of economic services. Besides these their employment and labour skills indicators are also better than the other members of the group. On the other hand their higher educational and R&D capacities, their civil society activities and their results in winning grants through competition are below of their group's average. Their outstanding economic results are sufficient for regarding them as IS centres but insufficient for reckoning as the most advanced members of the cluster. On the basis of the cluster's distance from the centre the micro region of Nyíregyháza is obviously different from the others as it can be regarded as a transitional area towards local centres. Its inclusion in the cluster – by our opinion – originates from the rapid economic development of the past ten years (infrastructure developments, the growing capacities of higher education, the quick growth of employment). However the city's development into a real regional centre is hindered by the proximity of the region's other two cities: Debrecen and Miskolc.

11 micro regions have been selected into the second cluster: *the local centres of IS development*. The cluster is composed of the micro regions of 10 cities of county rank (7 are county seats) and of the micro region of Budaörs. Cluster members have an outstanding position in their spatial structure due to their high concentration of the ICT sector (but the dominance of servicing ICT enterprises is also remarkable) and their degree of technological supply is also above the average. In this aspect their lag behind the previous clusters is minimal as none of their development indicators differs significantly from the members of cluster 1 (*Figure 6*).

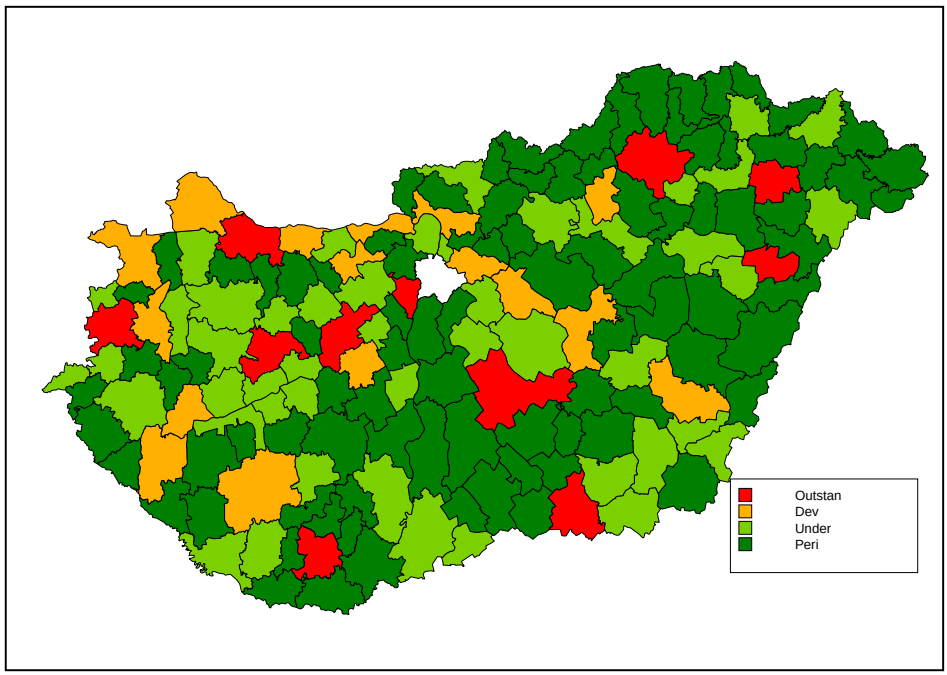
But centres of secondary IT education are also located in these micro regions. It is important that these micro regions also have good civil society activities and achieve good results in winning grants through competitions. These facts are clearly verifying that they have the parameters featuring the second wave of IS which in certain cases – principally in cities with above average higher education and R&D facilities – are extended by the characteristic features of the third wave as well.

Some handicapped micro regions are also included in the group. This is partly due to their favourable location in the Budapest agglomeration (Budaörs micro region), or due to their proximity to Hungary's west border (Sopron-Fertőd micro

region) or due to their traditionally advanced industrial structure (Dunaújváros micro region).

Figure 6

The possible grouping of Hungarian micro regions based on the data of factor 3, 2006



Source: The author's own calculation and edition.

The position of the cluster's core – county seat centred – micro regions is justified by the high concentration of professional training (especially secondary education) and the concentration of ICT enterprises seated in settlements with central functions. In comparison to the centres of IS here ICT services are in dominance. However these micro regions' higher educational and R&D capacities are limited and they have no or very few campus role performing university centres or university bound R&D capacities. Because of county seat functions their service palette (such as banking, incubator house, media facilities) is much better than in any other micro regions of lower development stage. Compared to IS centres it is a difference that in these micro regions the dominance of ICT service provider enterprises is clearly noticeable. However their higher educational and R&D potentials are limited as they have no or very limited number of campus role player

university centres with tied to them R&D capacities. However functioning as cities of county rank their service palette (e.g. banks, incubator houses, media) are much more advanced than of micro regions ranked by development degree into a lower category.

Dunaújváros and Sopron–Fertőd micro regions are the weakest (though having not much different indicators from the centre) members of the cluster. Their good employment and professional skills indicators, the advanced level of local media and their existent higher educational capacities make them eligible for cluster membership.

53 micro regions have been selected into the group of *partial peripheries.* The common features of these micro regions are their average technological development and their social maturity. *Their spatial location is not concentrated but their density is typically the largest among the micro regions of clusters 1 and 2.* It is important to mention that the internal differentiation degree of partial peripheries is very high.

County seat centred micro regions excluded from the previous cluster (Tatabánya and Zalaegerszeg) are a special group from the aspects of development. By their major features of IS development they are closer to local centres but their development level (except for the technological development factor) is lower. Their transitional position is indicated by the large positive distance measured from the factor centre.

Regarding the reasons of the advanced level major tourist spot areas formulate a special group which – due to the content and activity factor – have a better position in the IS relevant development hierarchy than they would be eligible by their actual economic development stage (such micro regions were selected into this group as Balatonalmádi, Balatonföldvár, Balatonfüred, Fonyód, Hajdúszoboszló, Keszthely–Hévíz and Siófok).

Another group is formulated from the micro regions feeling as the losers of the whole transition process into market economy and now regarded by spatial development aspects as handicapped areas. Their relatively good position stems from their local community building skills, from their preference of local development projects oriented towards the preservation of local values, from their micro regional strategies targeted at the development of IS and from their great ambitions in rendering content provision services and in participating in competitions for grants. We selected Aba micro region (the single one without city rank centre) with Szigetvár and Zirc micro regions into this group. This is verifying *Éva G. Fekete* (2005) earlier mentioned theory stating that cooperation, uniqueness and solidarity may reduce the disadvantages originating from peripherality.

The micro regions receiving the out radiating effects of Budapest are a special group. They are common in being the members or being located very close to the Budapest agglomeration zone (Dunakeszi, Esztergom, Gödöllő, Nagykáta, Szen-

tendre, Vác) and in their above average values of social maturity (due to the sub-urbanization of families with high social position), employment rate and professional skills. Our results on the other hand are also revealing that the proximity of Budapest is only a potential chance for social integration but it is insufficient alone for playing a dominant role in development.

96 micro regions have been selected into the group of *complex peripheries*. The majority of micro regions can be categorized as the complex peripheries of the IS. They are all lagging micro regions in economic, social, technological and content sense and in several cases do not show any signs of readiness for the integration into IS or even in of its partial components. Their spatial concentration can clearly be identified, more than two-thirds of the micro regions located east and about one-third of micro regions located west from the Székesfehérvár–Pécs axis fall into this category. Independently from their geographical location the ratio of ICT enterprises is very low in these micro regions, higher educational and R&D capacities carrying the potentials of IS development are missing and civil society activities are also low in this group.

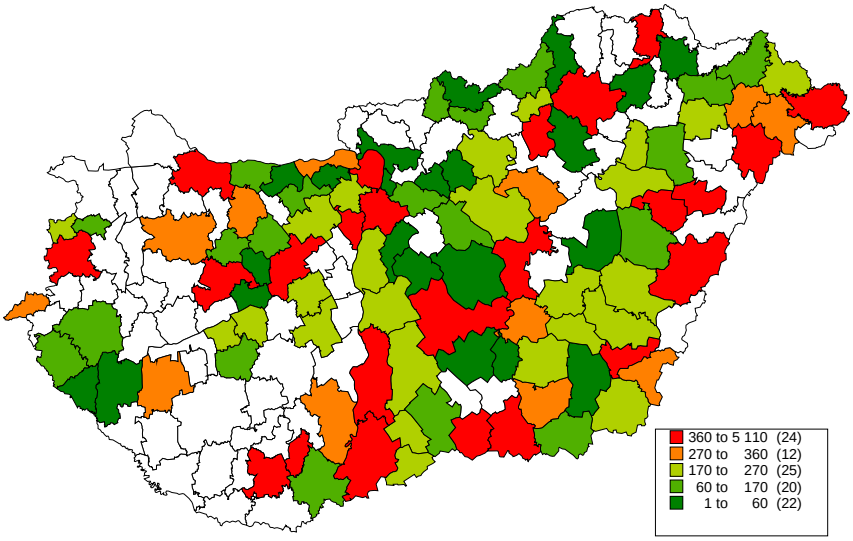
However the cluster's members have much better values in the field of grants won by competitions. These micro regions (or rather their hosting counties) by the absolute sum of financial grants won by competition and by their per head value are in better position than they would be eligible by their economic performance. This can be seen by the examples of Baranya, Csongrád, Szabolcs-Szatmár or borsod-Abaúj-Zemplén counties as their absolute regional development grant figures and their per capita indicators are ahead of Győr, Veszprém or even Fejér counties. This is well seen by the territorial division of IS related development grants won from the EU Structural Funds (*Figure 19*).[10]

This can partially be explained by the fact that – following the EU practice – Hungarian regional development policy regards the closing up of micro regions (i.e. creating spatial cohesion) one of its key elements. On the other hand these micro regions have a kind of 'expectation for miracle' attitude towards ICT development (*Csatári – Kanalas,* 2002) which explains their increased activities. What is a drawback for such kind of development is that it is encouraging the building of primary infrastructure only. This means that it will formulate such a development profile which is characteristic for the first wave of the information

[10] By the overall results of NFT1 (National Development Plan) the development level surpassing economic performance potentials besides the development resources of IS development can be verified by the correlation between economic development level and the sum of grants won by competitions. These microregions (or rather their hosting counties) by the absolute sum of financial grants won by competition and by their per head value are in better position than they would be eligible by their economic performance. This can be seen by the examples of Baranya, Csongrád, Szabolcs-Szatmár-Bereg or Borsod-Abaúj-Zemplén counties as their absolute regional development grant figures and their per head indicators are ahead of Győr, Veszprém or even Fejér counties.

society only. Besides it alone does not contribute to the improvement of the other factors of development.

Figure 7
Grants won from NFT I (National Development Plan) for the development of information society (million HUF, as stated on 31 May 2006)



Source: The author's calculation and edition based on NFÜ (National Development Agency) data.

And finally we must emphasize that *de jure city centered micro regions create a special sub-group by their negative distance from the cluster centre.* They typically do not show any features of IS integration which – by our hypothesis – will put these micro regions into a persistent lagging position. Several micro regions fall into this category such as Abaúj-Hegyköz, Bélapátfalva, Dabas, Ibrány–Nagyhalász, Jánoshalma, Lengyeltóti, Mezőcsát, Mezőkovácsháza, Őriszentpéter and Zalaszentgrót.

The *results of researches* carried out by the application of the above-described methods *point out that the fragmentation of the Hungarian spatial structure – even by the driving force of the factors of information society as restructuring processes – will not fundamentally change but these factors are rather modifying or fine tuning the traditional key elements (depending on their position and geographical location in settlement hierarchy) or even changing the role of its determining factors*.

This clearly shows the increased importance of localities. Thus, in its present form it may bear the potentials of decreasing those social and economic differences that have emerged with the change of regime. However this real alternative is offered for only a very small number of micro regions where building autonomous local community is a key issue of the local municipality's development policy. At the same time it also increases development differences which will further grow by the development of the economy and by the emergence of higher education oriented functions and this will further increase the comparative advantage of cities. Being aware of our results we consider very important to remark that the absence of radical changes is explained by the fact that our indexing system was built on the results of traditional complex spatial structure researches. This comprehensive interpretation of the factors of information society by our opinion was a great help for getting a better insight into the ongoing real processes. And finally it must also be taken into account that the – evident from the results – complexity of spatial structure presupposes taking a series of differentiated development policy oriented measures. This means that the key areas of policy should be designated not only by considering the EU and national strategies but sometimes they should even override them.

3.2 How big cities are progressing?

3.2.1 The background and the objective of the partial analysis

The transformation of the urban network that followed the change of regime is one of the key elements of the above-mentioned spatial restructuring processes. The heterogeneity of the network had become obvious even by the late 1990s and it had also become evident that cities on different development levels of the urban hierarchy have diverse development progress as well (*Rechnitzer,* 1993; *Beluszky,* 2001). By their functional role it was the most rapidly developing big cities that got into the most favourable position. Their importance in governance (administration) quickly grew; their innovative capacities increased and they also came up as the leaders of economic modernization (*Rechnitzer,* 2004). The complex, multivariate statistical analyses of the urban network are also verifying the concentration of innovation and knowledge bases in big cities. It was only the cities of the Budapest agglomeration zone and cities with traditionally strong knowledge base that were capable for joining this trend (*Rechnitzer,* 2003).

In the Hungarian literature we can find some hints (and the results presented in the previous chapter are also indicating) that the elements of the information society can be identified at a limited scale – in the majority of cases at the points of spatial structure and a massive spread of the new paradigm can be expected in

long-term perspective only (*Csatári – Kanalas,* 2002). For this reason we consider the revision of the Hungarian urban processes very important. The necessity of our partial survey objectives is justified by the results of our micro regional level investigation which unambiguously detected a correlation between position in the spatial hierarchy and the degree of IS integration.

Proceeding from the above *the objective of our partial research is to reveal what impacts the spread of information society does have on socio-spatial differences in Hungarian metropolitan areas*. On the one hand we are trying to find an answer for the question what status formulating features create a gap between those involved in and excluded from the spread of information society. On the other hand we are also investigating how the impacts of the digital divide influence the patterns of residential behaviour) in such areas as interest enforcement, civil society activities, sensitivity for social problems and attitudes towards conflicts). This latter problem brings a new content into our partial survey. It does so by examining the new aspects of digital inequalities with special regard to the interrelations between exclusion/integration and relations within the community.

3.2.2 Methodological background

We have examined the integration degree of the inhabitants of Hungarian urban areas into the information society, the special features of socio-economic inequalities on the basis of a representative residential survey carried out within the framework of an NKFP research project[11] titled 'Urban Areas, Socio-economic Inequalities and Conflicts'[12].

The possibility for conducting a partial survey investigating the characteristic features of urban areas was granted by our opportunity for compiling a series of queries concerning the integration into the information society within the NKFP project.

[11] The National Research Development Project (NKFP 5/083/2004) titled 'Urban Areas, Socio-spatial Inequalities and Conflicts – Factors of Increasing European Competitivenesss' investigated the socio-economic inequalities and conflicts of Hungarian urban areas and the characteristic features of the factors of competitiveness. The leader of consortium is the Sociological Research Institute of HAS. The collaborating partners of the consortium were as follows: West-Hungarian Research Institute CRS HAS Central Transdanubian Research Group, Pestterv Pest County Regional, Settlement and Environmental Planning and Consulting Ltd.

[12] The questionnaire survey was prepared in the nine Hungarian big cities (Budapest, Debrecen, Kecskemét, Nyíregyháza, Szeged, Győr, Székesfehérvár, Miskolc és Pécs) and their background settlements and in two control settlements. A personal questionnaire was used as a method for data input resulting in 5248 successful interviews. The interviews were recorded between 12 November and 12 December 2005. The residential survey was conducted by TÁRKI Rt.

In the present partial survey by using the database of the questionnaire survey and by preparing statistical summaries (two and three-dimensional) we analysed the problems in several steps:

- In the first step we analyzed technological supply with its relevant social status indicators which was done for specifying their determinant factor groups.
- In the second step on the basis of status indicator factors as determinants of digital integration the residents of metropolitan areas were arranged into different groups.
- In the third step we investigated the patterns of residential behaviour with their possible variations.

3.2.3 Results

In the first step by using the traditional interpretation of digital divide we considered very important to examine the accessibility to PC and to the Internet in metropolitan areas. In the full sample the ratio of PC supply is 42% exceeding the national average of 31% (Feketén, fehéren, 2006). This is verifying the earlier mentioned trend where PC supply is correlating with the position taken in settlement hierarchy (this is clearly bearing the marks of concentration). We must emphasize that this hierarchy was partially modified after gathering data from background settlements. Their overall PC supply ratio is 35% indicating that the multiplication effect of big cities is felt in settlements functionally tied to them.

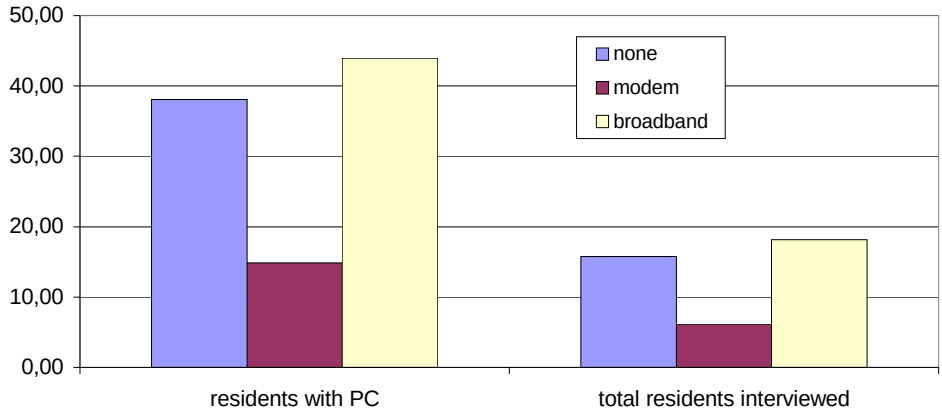
Internet supply figures show a similar tendency as we have measured by far higher ratios (24%) than the national average (15%) (*Figure 8*). It is important that PC supply directly determinates Internet access and the role of other devices (PDA, notebook, mobile phone) is yet negligible today. We must also emphasize that with building up the primary technological infrastructure the use of broadband connections became dominant.

We consider extremely important by what social status indicators digital inclusion is differentiated (*Table 5*). Our research results indicate that *of the determinative social status indicators income level, education level and knowledge of languages are the strongest differentiating factors*. This is partially correlating with the results of international researches where incomes, age, gender and education level are regarded as the main status grouping factors (eInclusion, 2001; OECD*,* 2001; *Norris,* 2001). The differences in the two results are mainly arising from the low level of English language knowledge. Apart from this the very similar integration level of the different age groups is also a unique feature which – according to our hypothesis – with the exception of old age population – shows a high level of adaptive skills.

By the above-mentioned status indicators the integrants and the excluded[13] are clearly separated into two groups. Within the each group we specified two sub-groups such as integrant high social classes and integrant low classes as well as excluded high social classes[14] and excluded low classes. By our hypothesis these four groups' behavioural patterns and adaptive skills are differing from each other. In the further phase of our research we are checking if this hypothesis of ours was right. At first we must prognostify the differences among the four groups in such areas as the ability to enforce local interests, development orientation, sensitivity for problems, civil society activities and the utilization of services.[15] One of the key areas of our research is investigating spatial differences in the ability to enforce residential interests and revealing the differences in social integration into the information society. In this matter we have registered quite significant differences between the different residential zones of metropolitan areas (*Figure 9*).

Figure 8

Internet supply in the metropolitan areas of Hungary
(percentage of adult population)



Source: The author's own edition based on questionnaire data.

[13] As we have earlier mentioned we measured the integration into information society (digital inclusion) by the figures of PC and Internet supply the traditional elements of digital divide.
[14] We selected people speaking at least one foreign language with at least secondary education with higher than 100,0001- HUF monthly income into the group of high social classes.
[15] In the analysis in all cases we took the differentiating effects of social position and of spatial location within the metropolitan area into account.

Table 5

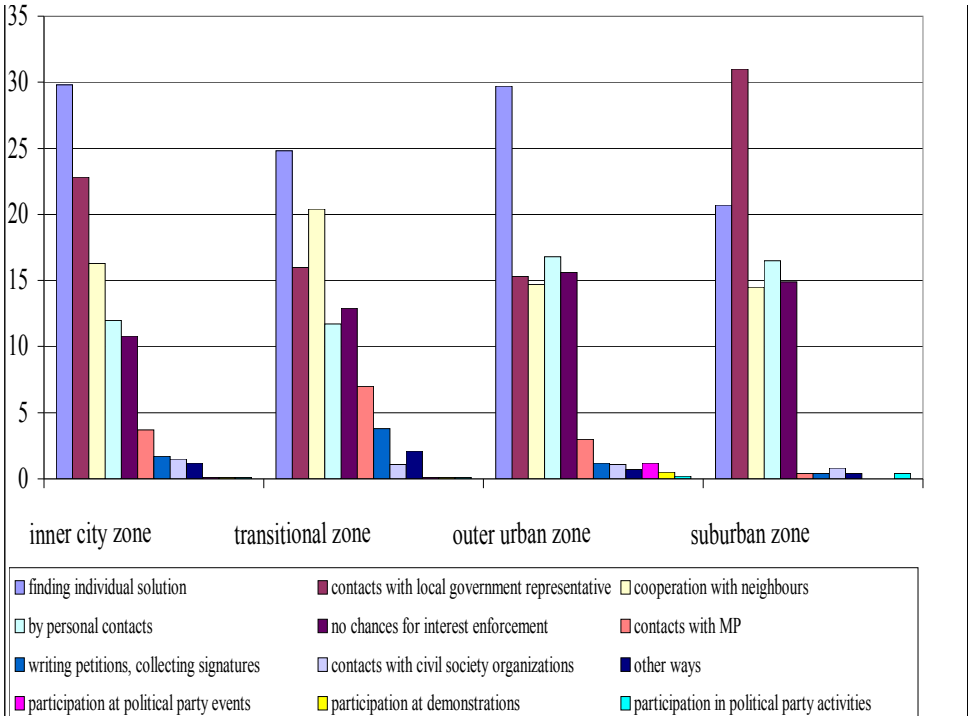
Digital inclusion shown by social status indicator (percentage of adult population)

Social status indicators		PC supply	Internet supply
Knowledge of languages	speaks foreign languages	66.35	46.51
	does not speak foreign languages	29.85	15.85
Position	self-employed, entrepreneur	77.39	56.66
	employee, manager	55.40	39.78
	brain worker	58.34	40.10
	manual worker	22.65	10.27
Activity	active wage earner	56.78	36.29
	pensioner	19.33	13.06
	child-care allowance	47.84	27.74
	student	83.90	47.45
	unemployed	22.67	6.54
	other inactive	39.16	13.53
Monthly income	less than 50 thousand HUF	22.50	11.00
	50–75 thousand HUFt	28.34	16.11
	75–100 thousand HUF	42.24	22.05
	above 100 thousand HUF	73.31	56.46
Age	18–29 years	55.60	33.28
	30–39 years	63.00	37.55
	40–49 years	49.94	32.24
	50–59 years	40.46	25.17
	over 60 years	15.64	10.52
Education	primary	19.40	7.90
	secondary	55.64	34.40
	higher	70.15	52.39
Number of children	none	43.40	31.33
	one	58.43	35.45
	two	62.90	47.01
	three	60.79	54.86
	four or more	51.51	38.63

Source: The author's own edition based on questionnaire data.

Figure 9

The evaluation of the efficiency of the different forms of interest enforcement by residential zones (percentage of adult population)



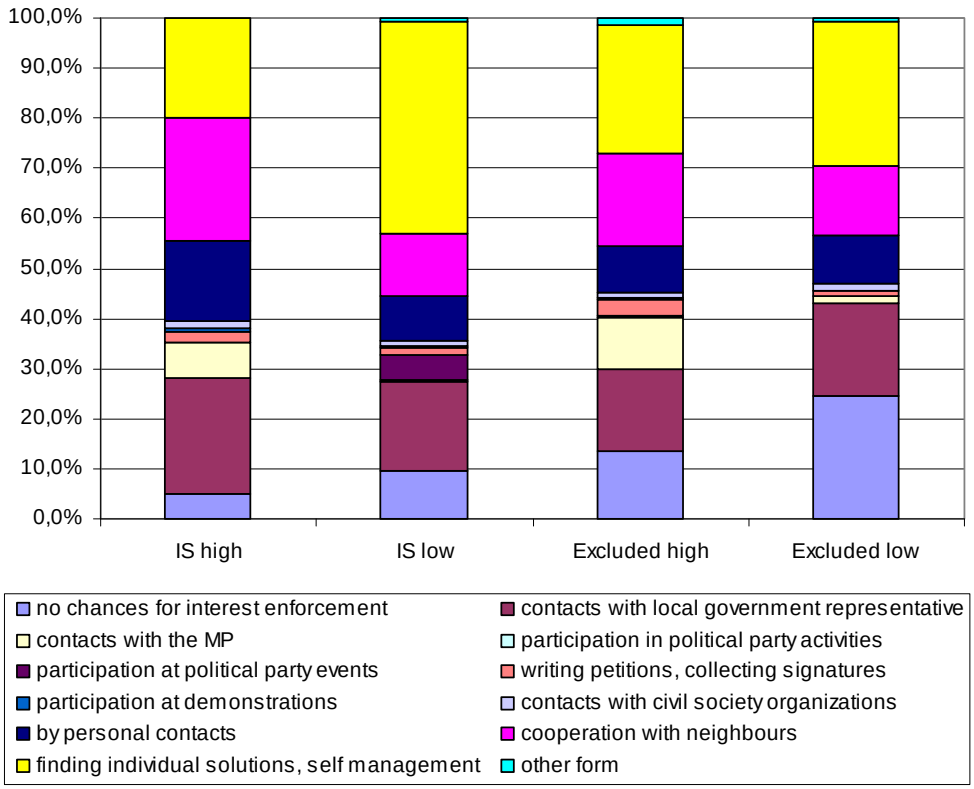
Source: The author's own edition based on questionnaire data.

By the correlation between the modes of interest enforcement and residential location we can draw the conclusion that urban zone residents prefer individual solution methods while background settlements are favouring community-based (above all contacts with municipal representative) methods. It is important that building contacts with the MP seems as a real alternative in metropolitan areas only. It is also important that at higher educational level the chances of interest enforcement improve and the role of personal contacts and residential cooperation increases. The use of individual solutions is high for people with primary and secondary education. It is still high for people in higher education but it is not the most way of interest enforcement. The high significance of local representational democracy is indicated by the high trust towards local government representatives without any regard to the level of education (*Szépvölgyi,* 2007).

Beyond spatial location the position within the social structure further differentiates the ability for interest enforcement (*Figure 10*).

Figure 10

The evaluation of the efficiency of the different forms of interest enforcement depending on the degree of integration into IS (percentage of adult population)



Source: The author's own edition based on questionnaire data.

The results are indicating that *IS integration increases the role of community-based solutions and the role of contacts with the municipal representative.* This attitude depends less on spatial location. It is important to remark that the ratio of persons seeing no chances for the enforcement of their own interests is higher among the excluded regardless from their social position. On this basis we suppose that *IS integration is opening up new ways to interest enforcement and the access to information elicits a higher intensity of the activities from people integrating into the information society*. We must emphasize that the differentiating role of IS integration with the dominance of high classes is evident in the field of personal relations as well. In our opinion this is also due to the improving supply of information.

From the correlation between spatiality and the differentiation of social classes resulting from IS integration it can be deducted that the presence/absence of interest enforcement nodes does not depend on spatiality and its intensity is not determinated by social status. From this aspect IS integration plays an outstanding role. However in case of contacts with civil organizations spatiality is also an outstanding factor (metropolitan dominance) where social status has a leading role. (regardless from IS integration). And finally the increasing role of personal contacts as progressing from the city centre towards the suburban zone is differentiated by ISIC integration and the position within this environment.

The development orientation of the residents surveyed (the evaluation of local development objectives) shows correlation in several aspects with IS integration (*Table 6*).

After evaluating all the answers we can see that interviewees consider managing educational, cultural and health care issues the most important ones. The issues of living conditions also have high importance. This means that in regional development we can discover a change of paradigm focusing on aspects improving living conditions and concentrating on the qualitative elements of development (*Baráth* et al. 2006). This does not change with IT inclusion and it is neither differentiated by urban residential zones.

When evaluating the individual factors we consider very important to emphasize that interviewees do not think any more that the only chances for the further development of economy would be settling down multinational firms. This viewpoint stands on two reasons. On the one hand the metropolitan areas on our survey site are concentrating these companies but in several cases these companies fail to find a suitable environment (adequately trained labour force) for their further expansion. On the other hand the dependence of the local economy on international investors urges the areas of our survey site for concentrating on strengthening their local economy. By our opinion this is the reason why our interviewees consider a greater and more efficient support of SMEs and the expansion of local economic cooperation clusters and multi-agent networks very important. The measured high values in cities are primarily correlating with high social classes and particularly with IS integration while in urban peripheries the dominance of low classes can be observed. This may be explained by the disadvantages of commuting or by the increasing demands for local development issues to address these problems.

From the point of our topic the evaluation of higher education and R&D has primary importance which on the one hand is based upon the fact that cities with high capacities and long traditions of higher education (e.g. Miskolc, Debrecen, Szeged and Pécs) continue to treat the development of higher education and R&D as priorities. On the other hand in big cities where the development of these two areas started in the last decade only (e.g. Győr, Nyíregyháza, Székesfehérvár) are

tailoring their further development steps to the current demands of economy. Furthermore they are also emphasizing the key importance of higher education and R&D in formulating new centres of development. The results of earlier researches in the aforesaid cities are also verifying their high innovative skills and the role of R&D and higher education in this process (*Rechnitzer – Csizmadia – Grosz* 2004; *Szépvölgyi,* 2006). It is important that the high appreciation of R&D and higher education is bound to high social classes which is slightly differentiated by IS integration. Moreover attaching high importance to these two factors is definitely more dominant in cities. Our results indicate differences in civil society activities as well (*Figure 11*).

Table 6

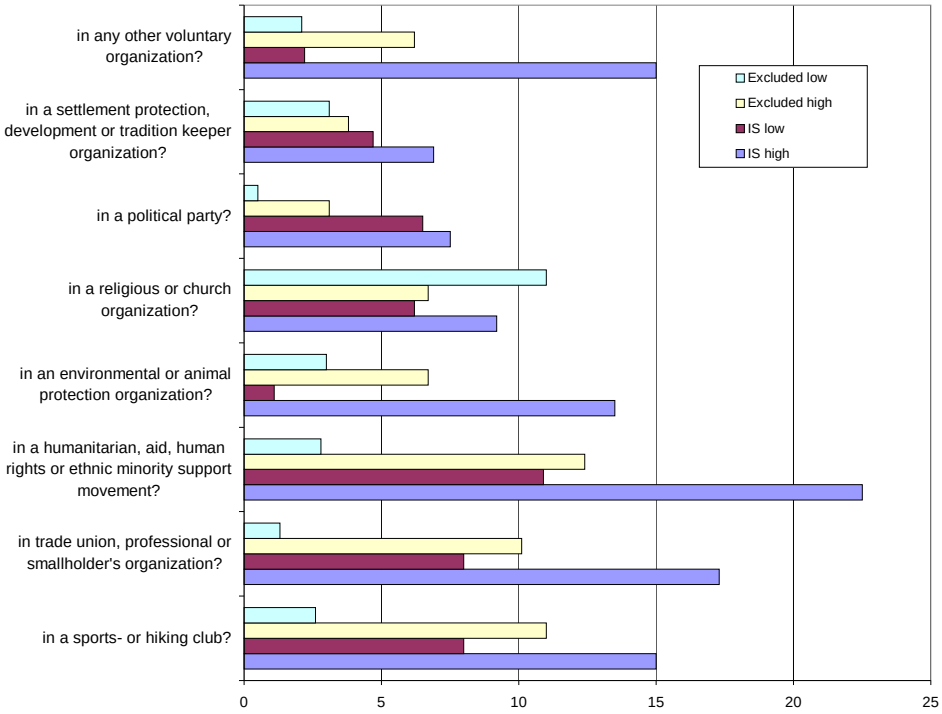
The evaluation of the importance of some aspects of local development (issues bundled into a group of 5by importance)

	IS high	IS low	Excluded high	Excluded low
The settlement of multinational firms?	13.8	20.2	13.7	16.9
SME support?	39.2	27.8	35.1	26.7
Development of tourism?	39.0	31.3	35.8	24.8
Development of sports, active leisure and recreation facilities?	43.8	37.7	34.8	20.5
The quality and improvement of the institutes of primary and secondary education?	46.0	43.5	53.2	27.5
The development of the institutes of higher education?	44.0	38.2	45.2	22.8
The development of R&D organizations?	37.5	21.7	40.3	17.0
Cultural events?	48.8	31.0	41.8	22.8
The professional competence of settlement managers?	72.6	69.9	65.8	48.9
Providing information about the settlement?	52.9	46.2	47.9	33.3
Involving local residents into local decisions?	49.3	54.8	43.1	44.6
Political stability?	40.6	52.1	48.0	29.9
The development of local civil organizations?	30.9	30.4	37.2	20.3
Building municipal flats?	41.8	53.1	46.3	42.9
The quality of health care services?	62.9	73.3	77.1	66.0
Public security?	74.0	82.2	81.6	69.6
Environmental issues, nature conservation; waste management?	65.9	62.8	68.9	52.9
Improving the local residents' living conditions?	64.5	77.7	76.5	70.7
Making the place attractive for living here?	73.1	90.1	77.5	77.7

Source: The author's own edition based on questionnaire data.

Figure 11

The evaluation of the efficiency of the different forms of interest enforcement depending on integration into the IS (%)



Source: The author's own edition based on questionnaire data

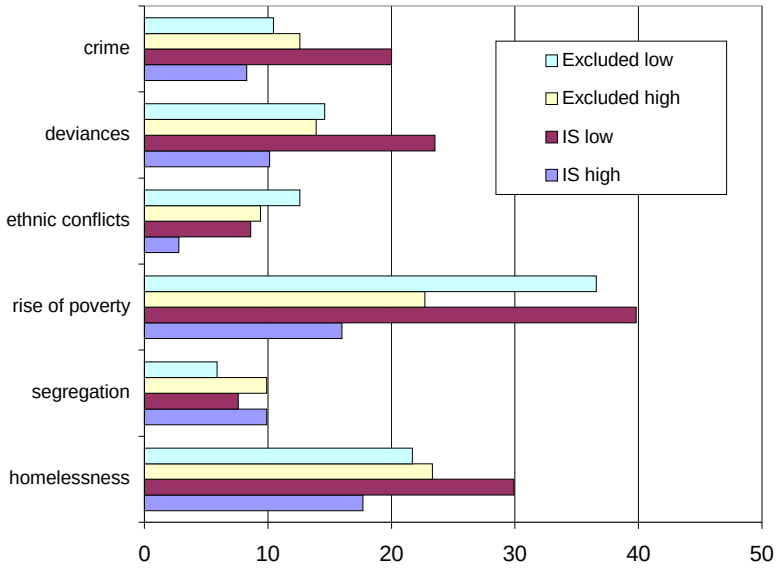
The majority of our interviewees work for professional, humanitarian and religious organizations. Their involvement in such activities is influenced by spatial position as a rule because the inclination for participating in the activities of humanitarian organizations is gradually diminishing by progressing from the metropolitan centre towards urban periphery. As it is seen from the results in *Figure 11* these parameters are strongly influenced by IS integration and the high or low social status associated with it. *The degree of the involvement in the activities of sports, professional, humanitarian, settlement development and environmental organizations is outstanding among the interviewees who are members of the high classes of the IS.*

We find our awareness of problem sensitivity and the problems of spatial and social inequalities also very important (*Figure 12*). The major general trend is that

the seriousness of the issue of homelessness depends on the distance or on the proximity to the urban centre i.e. from spatial location. It is also important that social deviance is almost entirely but not exclusively an urban issue. We must also call the attention for the decreasing awareness of the social problem issues of segregation and crime in different urban residential zones as we are progressing from the city centre towards the urban periphery.

Figure 12

The evaluation of different problems (listed as very important issues (%)



Source: The author's own edition based on questionnaire data.

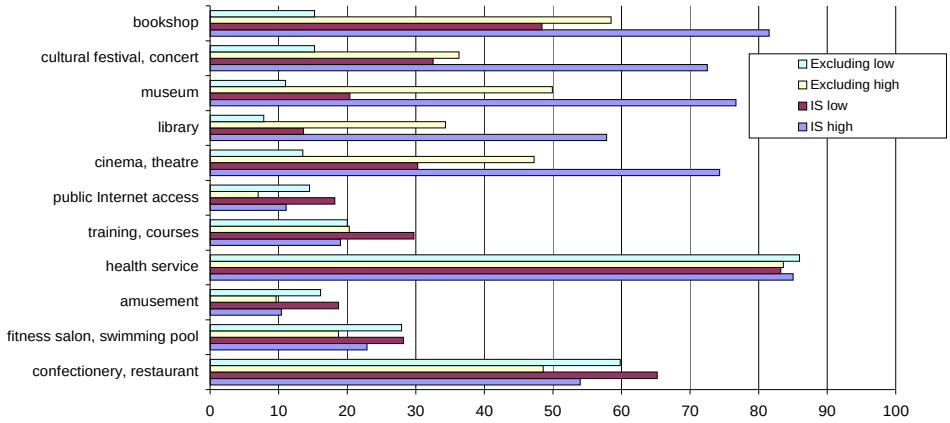
Regarding IS integration we must emphasize that low social status (regardless from IS integration) involves higher sensitivity for social problems. The only deviation from this trend can be experienced during the evaluation of segregation only. In the majority of cases (crime, deviance, poverty, homelessness) IS integrated low social classes proved to be the most sensitive. According to our hypothesis this may be explained by their spatial location. They live in the same residential zone where these problems arise. Our hypothesis is verified by the results of survey.

And finally we faced interesting inequalities regarding the utilization of services (*Figure 13*). As a rule we can declare that use of education, recreation and catering services depends which residential zones they are provided in and as a

general tendency their usage is decreasing as progressing from the city centre out to the urban periphery. The number of visitors to cultural events, cinemas and theatres shows a different trend. Besides city centre residents the population of urban peripheries use these services in the greatest number. This is because the concentration of high social classes is the highest in urban centres and due to sub-urbanization in rich urban peripheries.

Figure 13

The utilization ratio of different services (%)



Source: The author's edition based on questionnaire data.

IS integration and its modifying impacts on high classes involved in it are well seen in case of cultural services. However – according to our hypothesis – just in case of civil society activities it is not because IS and the high classes involved in it increase the utilization of cultural services. Here we can also see a reverse trend i.e. it accelerated the IS integration of people involved in this process. But regardless from that other elements are verifying *(WIR* 2005, *Feketén. fehéren* 2006) that IS integration – by widening the access to information sources – significantly increases the access to cultural services as well and to this IS low classes can close up in a short time. Consequently this further increases the social advantages of high classes.

Summing up the results of our partial survey on Hungarian metropolitan areas we can conclude that the effects of the IS are clearly seen in the different units of spatial structure. Thus, IS integration has a direct influence on the patterns of residential behaviour. The correlation between IS integration and residential

behaviour seems to be the strongest in the areas of interest enforcement, quality-oriented economic development and cultural services.

By this way IS integration further differentiates these spatial and social settings. For this reason we emphasize that researches of spatial structure must apply a complex approach attitude by a simultaneous handling of spatiality, social position and IS integration issues.

5 What final conclusions can be drawn?

Our paper was aimed at presenting some spatial formation impacts of the information society. The major findings of research are as follows:

1. From theoretical aspects we consider the overview of the characteristics of IS integration process as the most important subject of our research. Our results have proved that information society as an emerging paradigm of social development can be divided into several overlapping in timely and contentual aspects but quite distinct development phases. In our opinion this process can be divided (both in quantitative and qualitative aspects) into three development waves.
2. It is an important result that that the interpretation of the emerging spatial and social inequalities of the information society as a complex and multi-dimensional system is a very important result of our research. Our results demonstrate that the key mechanisms of the process can be arranged into two strongly correlating sets of factors. We name external factors, those circumstances which a territorial unit has no impacts on. We name internal factors those ones which have grown out of their own spatial and social environment. We are on the opinion that the two sets of factors have joint impacts on the evolution and nature of socio-economic differences.
3. We consider a very important result that the by using our earlier methods we have specified a set of research indicators for measuring spatial inequalities. By compiling the major parameters of inequalities we set up as an initial target the ability to explore the complexity and the embedment of IS into the traditional system of socio-spatial inequalities. To achieve it we proceeded from such a local (in our case micro regional) level set of parameters which exceeded the database structure of all the surveys having carried out so far. After starting out from 47 initial variables by applying a set of multivariable statistical analysis methods we were able to set up a model of the major factors of inequalities with 38 variables and with more than 80% of hit ratio. The four sets of factors by our opinion are verifying our hypothesis stating that spatial

development can only be examined in its full range if the conceptual system of information society is specified in a complex way.

4. On the basis of the specified indicator system we assessed the development level of Hungarian regions and set up four clusters of similar endowments (groups of similar development stage). Our results have proved that the emerging information society did not significantly reduce the development differences of the Hungarian spatial structure (nevertheless it rather increased in several aspects) but several features of the traditional centres have changed and some were expanded by new ones. The increasing traditional spatial differences intensified by the economic prosperity and the higher educational functions of big cities – especially of traditional regional centres – further increased their competitive advantages.
5. Exploring the impacts of the enlarging IS on the socio-economic differences of the Hungarian metropolitan areas is another important result of our research. Here we achieved two very important results. First by using the results of earlier researches we specified by what status formulating indicators the IS included and excluded groups are distinguished. Then we surveyed how the impacts of digital inequalities influence the patterns of residential behaviour. Our results showed that of the major social indicators of digital inclusion earnings, educational level and the knowledge of languages are the strongest differentiation factors. By these indicators we separated four groups as follows: IS integrating high classes, IS integrating low classes, excluding high classes, excluding low classes. Our hypothesis that the behavioural patterns and the adaptive skills of these four groups are different has been proved. Thus, IS integration (in several cases further differentiated by social status and spatial location) is definitely differentiating the patterns of residential behaviour. The strongest correlation was seen in such areas as the ability to enforce interests, quality-oriented economic development and the utilization of cultural services.

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