Regional Growth, Competitiveness and Development

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Contents

PART THREE REGIONS AND INNOVATION SYSTEMS

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Preface

This volume has been prepared by the Doctoral School in Economics at the Faculty of Economics and Business Administration at the University of Szeged on the occasion of the 1st Central European PhD Workshop on Regional Economics and Economic Geography, with the title "Regional Growth, Development and Competitiveness". The volume provides a review of selected papers presented at the PhD Workshop.

The Doctoral School in Economics at the University of Szeged aims at organizing a series of PhD workshops for Central-European doctoral schools in collaboration with the Doctoral School in Regional- and Economic Sciences at Széchenyi István University, Doctoral School in Regional Policy and Economics at the University of Pécs and the Hungarian Regional Science Association, ERSA Hungarian Section. The workshop offers specific training and provides opportunity for interaction amongst senior and young researchers in line with the research activity of the doctoral schools on the field of regional economics and economic geography.

The first part of the volume is dealing with regional growth, de-growth and development. It consists of five articles highlighting the role of territorial capital, possibilities in economic and urban development, opportunities of teleworking houses and concept of de-growth. The second part puts clusters and regional competitiveness in focus. Five articles provide insight to cluster development and policy, attractiveness of foreign direct investments, show measurement approaches of competitiveness in city-regions and facts on unemployment. The six articles of the third part are focusing on regions and innovation systems discussing university patenting, regional entrepreneurship, informal relations in innovation, technology transfer, activities of knowledge-intensive industries, theory of path-dependency and related variety.

We are grateful to Frank van Oort, Attila Varga, Attila Korompai giving plenary session and chairing the session of the PhD workshop, to the reviewers, Zoltán Bajmócy, Péter Járosi, Balázs Kotosz, Balázs Lengyel, Miklós Lukovics, György Málovics, Tamás Sebestyén, Izabella Szakálné Kanó for their contribution to the realization of the volume.

2013, Szeged, Hungary

Editors

PART ONE

Regional Growth, De-growth and Development

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1. Endogenous Development: Role of Territorial Capital in Rural Areas

Gábor Bodnár

Rural regions are unique territorial spaces in terms of economic abilities, social features and the settlement structure. Such areas have undergone meaningful changes throughout Europe, including Hungary. Important changes have taken place, creating functions other than agrarian production for rural regions. These new functions and their diversity requires a different, more complex analysis which in turn necessitates a different approach towards the understanding of the core elements of development in the regions in question. This includes focusing on social, economic, cultural and environmental factors and adjusts institutional design accordingly.

My work[1] *concentrates on the role of endogenous regional development and territorial capital in rural areas, reviews and evaluates available relevant literature and comes to findings from them. First, I briefly introduce Hungarian countryside and the changing rural territorial processes, then the unique importance of endogenous regional development and territorial capital in this context should be easily interpreted.*

In my work I intend to highlight the role of territorial capital in the development of rural areas. This special approach of endogenous development and its concept gives us a theoretical framework to measure and to compare different territorial units.

Keywords: endogenous development, territorial capital, rural areas

1. Introduction

If we examine rural and urban territories from historical point of view – as OECD (2010) does in its document -, they have been clearly differentitated from each other in terms of population. Inhabitants of rural areas largely accepted the fact that they were provided with distinct possibilities and occupational choices. Also, interaction between the population of these two types of territories was quite limited due to the fact, among many others, that available media in these regions had a tendency to discuss only local issues.

In the last few decades, major economic changes have taken place both in rural and urban territories, which process resulted in the decay of the relevance of traditional rural activities with regard to rural areas (van Leeuwen et al. 2009).

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However, the situation has changed by today – it is a huge advance that we can talk about brand new or highly appreciated functions of rural territories. Although it is true that the more complex approach of rural areas gained more and more stress, the diversity of functions and multifunctional approach were uniformly conceived and developed in the OECD (2006) „New Rural Paradigm" for the first time.

Consequently, paradigm change in the approach of rural territories, and enhanced emphasis on endogeneous development together throw a new light upon the possibilities of rural development and growth.

2. Short review of main processes of Hungarian countryside

As Sütő (2011) writes in an ESPON document, population of Hungary, and most of its part is being characterized by unfavourable demographic processes. The most unfavourable rural, peripherial north-eastern and south-western parts, and others too, of the country are typified by serious depopulation. On the other hand, Budapest and some wealthy western territories, predominantly bigger cities, show a population increase or at least stagnation.

As Enyedi (2012) articulates in relation to rural-urban dichotomy and their inequalities, neither the social nor the economic changes having taken place since the regime change provide favourable circumstances for eliminating differences.

Such a major shift necessarily has significant impacts: as Buday-Sántha (2010) notes, rural territories have undergone polarization in the last two decades. He also adds that the rising tendency of unfavourable processes in the field of economy and society is of concern. Along with the closing down of manufacturing plants and eliminating rural industry, the countryside was deprieved of its economic support. Villages in rural territories lost their local economic intellectuals, former leaders of the sometime manufacturing plants who would have been able to implement locally required develepoments.

In relation to the countrside, the role of agriculture has to be mentioned, which was characterized by uncertainity and convulsion due to sudden changes after the economic transition (Benet 2006).

Buday-Sántha (2010) adds that develepoment can be observed in those regions only that have been able to integrate into urban economy which, however, most of the rural territories did not manage to reach. Also, advantage of development resources can only be perceived in infrastructural improvements, while there seem to be no relevant agricultural achiements. Consequently, local governments without own income are struggling in such circumstances.

What is more, a significant polarization process evolved after the transition and remained peculiar according to Beluszky and Sikos (2007). They also add that such a process has several dimensions, for instance, one affecting the labour market, or another having impact on the composition of the local community.

3. Change of rural functions

After reviewing the Hungarian countriside, in this chapter I will discuss rural areas in more general. Despite of the many difficulties that Hungarian or Central and Eastern European rural territories need to face, we can talk about driving roles of changing processes of rural areas.

OECD (2006) confirms that nowdays rural areas face general challenges. These processes are being demostrated by socio-economic indicators. At the same time, we can see singular heterogeneity in the development paths of rural regions which goes beyond the traditional image of less favoured situation of rural regions.

As it can be read in an ESPON (2012) paper, over the years, rurality has generally been identified with the circumstances of being rural, and also, many functions and meanings have been tied to this concept in different contexts. Historically, rurality has had a tendency to be associated with often contrasting characteristics such as a happy agricultural lifestyle, and the struggle with harsh conditions at the same time.

The ESPON (2012) paper highlights the differences between equity and efficiency oriented politics. According to the paper, the first one aims at mitigating internal social, economic and territorial diversities in development and income, whilst the aim of efficiency oriented policies is to support economic growth with assets of improved efficiency and competitiveness. To place social, economic and territorial cohesion as top priority in all areas is the main focus of cohesion-oriented policy. Environmental and health related concerns are also being handled as of significant importance. In a cohesion based scenario diversification plays an active role and opportunities for SMEs, tourism and residential functions are promoted.

In this respect, it is not a coincidence that OECD (2006) introduces a new rural paradigm, which approach has a focus on places rather than sectors and stresses investments rather than subsidies. These key orientations are the result of at least three factors that have great influence on rural policy making across OECD countries (OECD 2006, p. 57-58.): (1)

increased focus on amenities, (2) pressures to reform agriculture policy, (3) decentralisation and trends in regional policy.

Besides the new rural paradigm, another change is also apparent. As Ward and Brown (2009) describes exogenous subsidy and support as old redistributive approach, now when we see the shift in thinking in regional policy, endogenous assets and capacities have a more dominant role as part of an investment-oriented approach.

4. Theory of endogenous development

The author of this article agrees with the general idea that while growth induces quantitative change, development results in qualitative change. By social economy, development is generally interpreted as economic development (Farkas 2002). However, it is worth noting, as Lengyel (2012) does, that economic development encompasses economic growth, because besides basic economic indicators it is advisible to take some other economic features into account as well.

In relation to regional economic development, Capello and Nijkamp (2011), besides others, give the examples of healthy living environment, access to social facilities and high-quality education.

When discussing regional economic development, Stimson and co-authors (2011) differentiate quantitative and qualitative attributes. The following factors are all of concern while carrying out measurements and monitoring regional economic processes such as changing wealth and income levels, employment levels, generating creative capitals, social and financial equity, or sustainable development.

Though this paper does not aim at discussing the subject in detail, further measurements in this field are definitely required.

Benko (1997) dates back the appearance of endogeneous development to the end of the 1980’s though it is a fact that then he talked about industrial and urban territories.

The tone of regional development theory and its focus has shifted from exogenous factors to a focus on endogenous factors during the past few decades (Stimson et al. 2001).

Essentially, endogeneous development means a region's reliance on and the best possible utilization of local resources and facilities. The question of endogeneous growth[2] also emerges in relation to the above mentioned concept.

Two major strands can be differentiated in the theory of local endogeneous development (Capello 2007, p. 184.): neo-Marshallian inquiry that has been dominating for years and which views local growth as a result of externalitites having impact on the static efficiency of firms; the neo-Schumpeterian literature that defines development as resulting from the impact of local externalities on the innovative capacity of firms.

Stimson and co-authors (2011) point out a further change in the focus of processes towards the principles of sustainable development in regional development and planning in the last two decades. According to this statement, the latter strategies would aim at creating favourable conditions for a region in order to make it able to better utilize its local resources. The primary focus of such attempts would be on endogeneous processes that would de designed to encourage collaborative advantage across the private, public and community sectors.

In the present conditions of focusing on sustainable development in regional economic development strategy it becomes more and more emphatic to concentrate on taking advantage of endogeneous factors while aiming at regional growth and development.

With the help of Stimson et al.'s work (which processes Nijkamp et al.'s and Capello et al.'s writings, too), and the application of the pentagon model of success factors, sustainable innovative development can be framed (Figure 1).

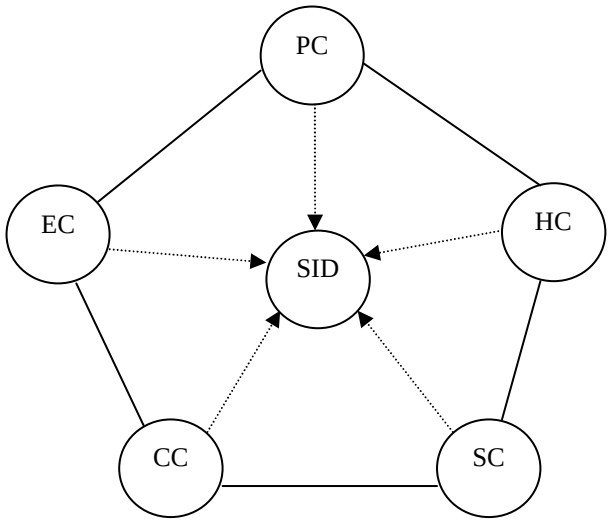
These elements of the model need to be mobilized in order to enhance regional development processes (Stimson et al. 2011, p. 10-11.):

1. The availability of productive capital (PC): this corresponds to neoclassical production theory where output is determined by the traditional production factors labour and capital.
2. The presence of human capital (HC): this refers to the quality of labour input obtained by means of education, training or new skills (for example, in ICTs) and may be seen as a productivity- enhancing factor. Clearly a balanced distribution of human capital over people is of great importance.

[2] The principle of endogenous growth relies on local endowments and capabilities of a certain region (Kengyel 2012). Reflecting on Romer's classic work, Kengyel (2012) and Varga (2009) argues that in the case of the above mentioned principle technological knowledge and human capital are the two determining factors.

3. The access to social capital (SC): this condition comprises interaction and communication between people, socioeconomic bonds, social support systems, business networks (formal and informal), relations based on trust, and so on.
4. The usage of creative capital (CC): this may be seen as a great ability to cope with challenges and new opportunities, and is reflected in entrepreneurial spirit, new ways of thinking and acting, trend- setting artistic expressions, innovative foresights, and so forth. Such a factor is often found in a multicultural urban melting pot.
5. The existence of ecological capital (EC): this condition takes for granted that a favourable quality of life, an ecologically benign condition in a city, presence of green space and water, or an attractive living climate (for example, recreation and entertainment possibilities) contribute significantly to the innovative and sustainable potential of a region.

Figure 1 A pentagon model of creative forces for sustainable regional development



Source: Stimson et al. (2011, p. 10.)

As it is described in an ESPON (2011) paper, most of the theoretical literature on intangible assets comes from the fields of regional development or entrepreneurship, and mainly places emphasis on urban territories.

The document (ESPON 2011) mentions two attempts which adapt these ideas in rural policy context. The first one is the assets-based approach to development (Braithewaite 2009), the second one is an examination of Camagni's (2008) concept of "territorial capital" by Courtney and co-authors (2010). I summarise Braithwaite's approach hereunder, while I do

not review the paper of Courtney et al., only mention their opinion very briefly in the next chapter.

Braithwaite (2009) uses a seven-element capital framework which corresponds to categorising assets (Table 1). The importance of this approch is that the framework includes political and cultural capital, which are particularly important in a rural context.

Table 1 The seven forms of sapital recognised by asset based community development

Capital	*Definition*	*Examples in rural context*
Financial	Financial capital plays an important role in the economy, enabling other types of capital to be owned and traded.	The liquid capital accessible to the rural population and business community, and that held by community organisations.
Built	Fixed assets which facilitate the livelihood or well-being of the community.	Buildings, infrastructure and other fixed assets, whether publically, community or privately owned.
Natural	Landscape and any stock or flow of energy and (renewable or non-renewable) resources that produces goods and services, (including tourism and recreation).	Water catchments, forests, minerals, fish, wind, wildlife and farm stock.
Social	Features of social organisation such as networks, norms of trust that facilitate cooperation for mutual benefit. May have "bonding" or "bridging" functions.	Sectoral organisations, business representative associations, social and sports clubs, religious groups. 'Strength' relates to intensity of interaction, not just numbers.
Human	People's health, knowledge, skills and motivation. Enhancing human capital can be achieved through health services, education and training.	Health levels less variable in an EU context. Education levels very much generational. 'Tacit knowledge' is as important as formal education and training.
Cultural	Shared attitudes and mores, which shape the way we view the world and what we value.	Perhaps indicated by festivals, or vitality of minority languages. Some aspects - e.g. 'entrepreneurial culture' - closely relate to human and social capital.
Political	The ability of the community to influence the distribution and use of resources.	Presence of, and engagement in, 'bottom up' initiatives, the most local part of 'multi-level governance'. Relates to local empowerment v. top-down policy, globalisation.

Source: ESPON (2011, p. 33.) based on Braithwaite (2009)

Braithwait (2009, p. 2.) describes the usefullness of the framework as „*…it can act as a 'prompt' to remind rural residents of the attributes of their area and of the potential they have for development*".

5. Territorial capital

As Blakely (2001) explicates, the basic concept of endogeneous development – or using local resources to achive better results – is supported by a theory according to which local resources are considered to be primary factors in achiveing or producing any outcome, let it be tangible or intangible goods. Planning is always based on indigenous activities and/or endogeneous develpoment, because the core of planning as a policy science is the application of principles that are crucial in relation to both space and location.

When working with the framework of the numerous types of capital we can talk about the appearance of territorial capital as a special approach of endogeneous development. This concept originally occured in so called „policy" documents (OECD 2001, EC 2005). Thus it has been formulated in the OECD (2001) document with regard to territorial capital that the territorial dimension has a determining effect on profitability and competitiveness of economic activities. However, a more scientific and sophisticated approch of the subject has emerged recently which belongs to Camagni (2008, 2009).

Camagni (2008, 2009) has worked out a framework which incorporates all tools that are important in relation to regional development. His approach provides the possibility of a homogeneous, theoretical framework, which is suitable for describing present regional processes, and also might be useful when making prognoses.

In this perspective, according to definitive approach territorial capital itself is a set of assets which determine a given territory's character (Camagni 2008).

When working with the Camagni territorial capital framework, it can be seen that the components of territorial capital are examined in terms of two factors (Figure 2): degree of materiality and rivalry. Private goods (such as the fixed capital stock or pecuniary externalities) are characterised by the highest degree of rivarly and materiality. Human capital has the highest degree of rivalry, but the degree of materiality is implicitly lower for this dimension. Materiality and rivalry are both low for social capital, while public goods (such as natural and cultural resources) is a dimension with high materiality, but low rivalry degree. Thus these goods that are positioned in the four corners of Camagni's taxonomy table can be treated as basic components of territorial capital. Also, they may be regarded as resources of regional endogeneous development (Lengyel 2012). Besides these four components, mixed goods – club goods and impure public goods – make up Camagni's taxonomy.

Figure 2 Territorial capital

Rivalry	**Tangible goods** (hard)	**Mixed goods** (hard+soft)	**Intangible goods** (soft)
High rivalry (private goods)	Private fixed capital stock Pecuniary externalities (hard) Toll goods (excludable) c	Relational private services operating on: - external linkages for firms - transfer of R&D results University spin-offs i	Human capital: - entrepreneurship - creativity - private know-how Pecuniary externalities (soft) f
(club goods)	Proprietary networks Collective goods: - landscape - cultural heritage (private 'ensembles') b	Cooperation networks: - strategic alliances in R&D and knowledge - p/p partnerships in services and schemes Governance of land and cultural resources h	Relational capital (associationism) - cooperation - collective action capability - collective competencies e
(impure public goods)	Resources: - natural - cultural (punctual) Social overhead capital: - infrastructure a	Agencies for R&D transfer Receptivity enhancing tools Connectivity Agglomeration and district economies g	Social capital: (civicness) - institutions - behavioural models, values - trust, reputation d
(public goods)			
Low rivalry			

Materiality

Source: Camagni (2008, p. 38.)

As Tóth describes (2010), what is unique about territorial capital is that it highlights difference between different geographical regions by allowing people residing in a certain territory to expect higher return for their investments. Success (return) of an investment is highly dependant on the location („genius loci"), which means that return rates also vary by region.

As we shall see, territorial capital with its approach and being structured in a framework goes far beyond the traditional economic conceptions applied both in the case of growth and development measurements (Lengyel 2012).

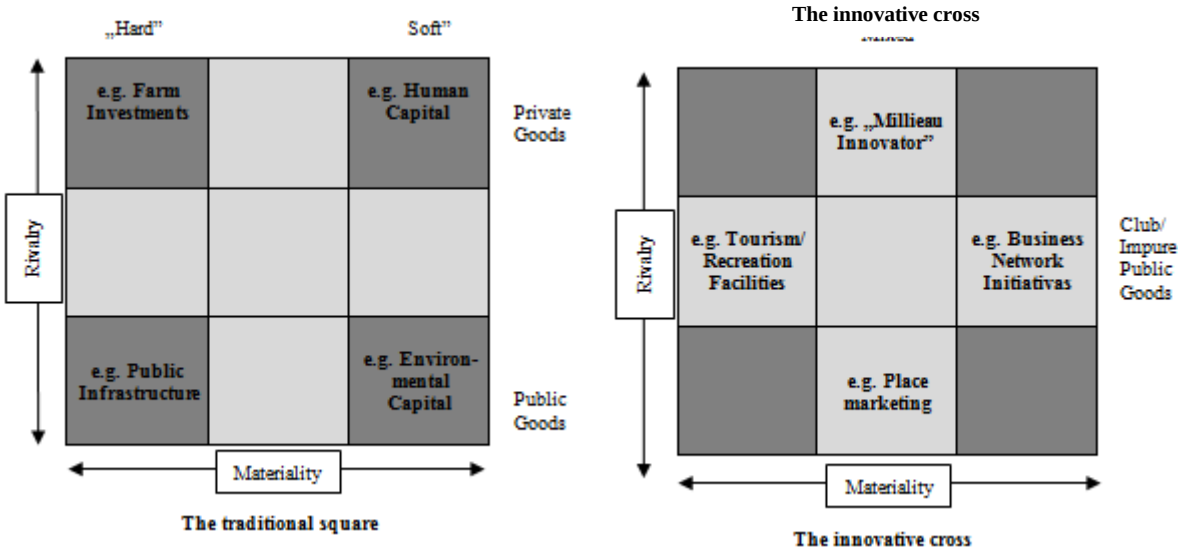
In relation to its usefulness Capello and her co-authors (2009) state that territorial capital and certain cognitive factors of it facilitate economic interactions. It is capable of enhancing the effect of certain factors on regional growth by increasing the efficiency of personal interactions.

When Camagni (2008) writes about the four extreme classes, he summarizes them as the ’traditional square’. The intermediate of the three-by-three matrix is called the ’innovative cross’, because it has interesting and innovative elements which attention should be focused upon.

Courtney and his co-authors (2010) analyse the innovative cross and as a critique they examine the limited applicability of Camagni’s model. They mention that cultural and political assets do not feature strongly in the framework.

In terms of rural policy, Copus et al. (2011) write about the dominance of the left hand side of the diagram (Figure 3) incorporating farm investments or public infrastructure. They make a suggestion to reinforce policy efforts in the case of the right hand side of the diagram, by supporting ’softer’ forms of capital.

Figure 3 Application of Camagni territorial tapital framework in a rural policy context



Source: Copus et al. (2011, p. 128.)

Copus and co-authors (2011) give some examples in the diagram on the right side. However, they add that selecting examples demonstrates that the clear distinctions of Camagni framework is not easy to apply in the real world. They also state that the use of the „right side” components in practice will also be difficult for policy makers, though it does not mean of course that the concept would not turn into the part of policy discourse.

I agree with Copus and co-authors (2011) and I have to mention the difficulty in measuring the right side (innovative cross), which at the same time, in my opinion, can be suitable for significantly expanding the possibilities of a ’hard’ quantitative analysis. And by doing so, it might provide a strong practical basis for statistical measurements in general.

5. Conclusion

In my work I reviewed endogeneous development, and a special approcach to it - territorial capital -, through pointing out the latter notion's expediency in terms of rural territories.

First, I introduced certain procesess of Hungarian rural territories after the regime change. In connection with rural ares I also discussed international trends and the changes in their functions affecting policies.

Endogeneous development relies on local resources of a certain territory instead of external intervention. The concept of sustainable regional development or even territorial capital could be mentioned as a wide approach to the subject.

Territorial capital might be handled as a sort of concept of endogeneous growth. In the Camagni framework, territorial capital is determined by the degree of materiality and rivalry of different goods. Traditional and innovative components of Camagni's concept together could be suitable for making up a framework that would be useful in carrying out measurements in the long term. We shall see that a number of critiques have been formulated in connection with the concept. In my opinion, besides their diverse quantifiability, traditional and innovative elements can be adapted to rural territories, as well.

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2.The Possibilities in the Economic Development of the Local Governments

Endre Lendvay

The system of Hungarian local governments went through changes several times. Municipalities treated the changes of both the systems and the environmental factors with flexibility. The key of the adaptability is the local economic development. Therefore it is a crucial question if the local community can have an influence in this field and in what measure. In my opinion the local community has effective tools, which should be used efficiently. The goal of the municipal acts is to adapt to the conditions of the different circumstances by changing one or more environmental factors. The PESTEL analysis covers the environmental influencing factors. Because the Hungarian municipalities have many different roles they also have many tool-kits. These can either strengthen or weaken each other's influences. As the first step of my research I analyze relationship between the identified roles and the required environmental factors by introducing real cases. The effects-pattern of the combinations of the used tools is variable too. It can be surveyed with the tool-effect matrix. For the moment it's only a qualitative sign, but the goal of research to find indicators to each cell, row and column which can quantitatively describe the status of the system and its changes.

Keywords: adapting, environmental factors, PESTEL analysis, municipal roles, tool-effects matrix

1. Introduction

The Hungarian local government system in few decades went through multiple changes. The settlements are handled the system and also the acting environmental changes in a flexible way. I have chosen this adaption facility for my topic. After determination of the basic goal of the economy development (independent from settlements) I examined for environmental factors and the opportunity to group the available devices.

After that I analysed the group of devices' effects on the environmental factors in Hungarian examples. Built upon the result I'm going to summarize the devices and their effects in the effect of devices matrix. After featuring the logical connection-system I'm going to review the index-system, which is needed to be worked out and make it applicable by more research. Finally I review the application and other research opportunities.

2. Literature review

The goal of the local economic politics is boosting the economy. But going through the seemingly simple sentence some questions are coming up. The first is what "boosting the

economy" means? The second is, if this goal is really in itself or it would only be defined in a wider correspondence?

In the related literature we can find a varied approach. Syrett (1995) separates boosting the economy and the conception of the local economy's initiative. The prior means the general developing process and the latter is to create concerns. Éva G. Fekete's (2005) thinks about developing the country, which is defined by interfering with the way of the local changes. According to Cecília Mezei (2006), developing is an intervention to improve quality, where the final goal is increase the population's living standard. In my opinion the last definition could be expanded with the following, the development's final goal is not just to increase the living standard, but in some cases to sustain, or just slowing down the decrease. Bartik (1995) and Čapkova (2005) prefer the increase of the living standard, according to them it could be acquired by developing concerns and creating new jobs.

I prefer to interpret the previous approaches altogether: the economy development effecting the environment, and it's final goal is to increase the local living standards.

The next question is whether the local self-government has the necessary devices to pull substantive effect on the development of the local economy. In a simple way: are there any local economy improvements or the improvement is only a consequence of a regional process. As Gábor Péteri (1994) see it, the local governments doesn't have any vital influence on the economical processes, despite of this they attempt to intervene. Faragó (2004) judges the options to intervene limited, and only approves to do so if the market malfunctions.

In the article, according to the previous I look answer for what devices has the local self government, and how they use them to affect their environment on behalf of improving the local development of economy and hereby offer opportunity to an increased living standard.

3. Environmental factors effecting the local governments

The local government's work can't confine oneself to simple economic representation, but at the same time it can't go without that. The local politics of economy's goal is to keep and improve the local quality of life, where keeping the settlement's traditions and values, sustaining and if possible enlarging the high quality of the settlement's services are essential. Among the always changing terms those settlements could be successful, which are able to adapt to the environment. This adaptation is influencing the environmental factors or the effect of these factors to the settlements. There is a well-known analytic method from the economical life, called PESTEL (Political, Economical, Social, Technological, Economical,

Legal) which helps traversing the environmental factors. The analysis gives a full picture of the influential environmental factor, but using it at local governments is naturally slightly different from the profit-oriented sector. The system could also be able to plan, and with its help the wanted developmental states are more precisely defined. The most important part of the development is the local economy, and the question is how can the local community and it's chosen leaders effect this area. In my opinion the local communities have effective devices, and if they can use them correctly, serious results could be reached.

On the basis of my previous thoughts I'm going to summarize them as he following:

1. The aim of the local governments is to adapt to the environmental terms by changing one or more environmental factors.
2. The effective environmental factors are covered by the range of the PESTEL analysis.
3. The wanted economic developmental goal and the results of the development could exactly be identifiable by the PESTEL analysis.
4. Because of the diversified roles of the Hungarian local governments they are equally able to enhance or weaken each other.
5. By using the devices systemically, the development by the previously fixed objectives is available for the affected economy of the settlement.

4. Functions and devices

First of all let's survey the resources which can be taken into the local governments! Because of the diversified roles of the Hungarian local governments they consist of different systems of devices which are equally able to enhance or weaken each other. During my study I found seven well separated factors. These are the political, proprietary, norm-maker, magisterial, marketing, employing, communication roles. Every function has different devices that are why the connecting devices' reach are different. Let's see the several functions and the available devices what belongs to them!

The first function is the political: The voters empower the corporation of deputy with power to manage the local matters. This role is the most important, when the local government prepares different strategies (IVS, -developmental strategies, fortune management, education planning, etc.) which influence the settlement's way of life. The agreements with other settlements (twin-city agreements, partnerships contracts, leader-community membership, EGTC institution - European Grouping for Territorial Cooperation)

are also belongs here. We can't forget about lobbying, which is an important part of the economy development, and keeping in touch with the local communities.

The proprietorial role naturally follow the previous, handling the wealth of community belongs to managing public matters. These kinds of tasks are managing the local government's properties, like maintenance and develop the real estates.

The norm-maker function also can be deduced from the public authority. The local government can or in some case it has to create measures. With this right they can make statutes about local taxes, keeping animals or building acts, etc. This could directly affect the local economy's work and in an optimal case the growth.

The *magisterial functions* are also involving some kind of price-authorities like water or wastewater, heating and public-meal prices.

The local government is also a *supplier* and a *procurer*, so it can be an active partner on the local field and a procurer, a supplier or a rival for the local *concerns*.

In most of the settlements, the biggest *employer* is the self-government, that's why it's an active partner in the local labour market.

Last but not least, the local government is a *communicator*. It also communicates with the citizens and the guests and investors who might be a partner in the future.

Using the colligated reviewed system of devices can influence the local economy's work. The different devices can weaken or fully extinguish each other if they were used inconsequently. The first step in my research is to analyse with presenting concrete cases the identified roles and the reached economic factors. I'm going to demonstrate Hungarian examples where the system of devices influencing together.

We saw the using of outbound system of devices in the fight of lobbies at the underground 4 project in Budapest. The result is mixed, and affects nearly all the environmental factors, as it comes true by similar reasons in some infrastructural developments.

Civilians for Budakeszi's Development (CIBUFE) are a better example for *using inside political system of devices* to hold together the local intellectual fund. During the years this community made a development of settlement, what was accepted by all political factions by the year of 2010. By a subsequent upon this document, the organization of Buda-környéki Natúrpark had started, and the idea of Budakeszi Gyerekköztársaság gets under way again. A cooperation was also started by Újfehértó 2 years ago which overarched the border (CBC - Cross Border Community). The program not only concern the local governments, but it also build upon the cooperation with civilian organizations.

For using the *norm-maker* function a simple example is to dismiss some local taxes, what brings significant boost in few smaller settlements (Komlóska, Megyer). Several businesses established premises to validate the allowances. In many places the local government took responsibility to refund taxes particularly. This “mini offshore” is rather some kind of tax-market gap then a comprehensive economic boost, but without doubt it’s an effective method to get more resources.

Another example for using settlement development devices could be the taxing of inbuilt, non agricultural parcel. This method used by several settlements around Budapest is boosting the effective economical usage by making the investment into estates more expensive. This way concern, which pay local taxes (industrial tax, building tax, communal tax), settle in and provide more workplaces. By shaping the local taxes statutes this way could improve the local economy. On the other hand I have to add, the measure could backfire among the condition of the economic crisis. In some cases the local government could reduce resources from owners without enough funds or force them to realize. In further friendlier environment this makes impossible for small and mid-sized concerns to strengthen and invest in a given settlement. For effective combination of devices Inárcs is a good example, where the settlement’s government decided about the requalification (*norm-maker function*), the building of public services, and about selling lands owned by local government (*proprietorial function*) to industrial and marketing purposes (market function). Estimated lands were sold with great profit, and settled concerns provided the long term operation of the settlement. Land and estate development following the PPP (Public Private Partnership) design produced similar results with mixed efficiency (swimming school program, heating and electrical infrastructure development). These programs in most cases worsen the balance (swimming school program: Bátonyterenye, Cegléd, heating: Ózd, Kazincbarcika). The bad results are not the PPP’s fault, rather than unprofitable contracts and unbalanced profit sharing and risk sharing on behalf of political pressure. That’s why multiple settlements (Szob, Gyál, Budakeszi) backed out from the construction. There are only more or less legal examples of the usage of *magisterial function*, where investments were discouraged by the local government until a beneficial agreement for the settlement born. In my opinion this system of device is meant to be used to enforce the local measures. These measures create also commitments and rights, enforcing these rules produces calculable investment environment, which boosts the inclination for investment in the settlement. Needles to explain the *procurer* function’s positive effect on the local economy, despite of this assigning the local concerns are expressly difficult. These reasons are consequence of the local economy’s limits of

competitiveness: because of the size of a country wide concern's economy is more competitive than a local concern's it can make better offers. Despite of this there are examples of winning competitions by local concerns (Szikszó). There are no obstacles in acquiring food from local manufacturers.

The *communication* function's local economy boost effect is shown by different settlement marketing solutions, which shows different success. Positive examples are Sümeg, and "institution of Várkapitány" but in this case it's more like a touristic catch than a settlement marketing. In the vicinity of Sümeg, Megyer is like a small traditional village, which makes us remember to the blissful days, attracting tourists to the formed holiday centre. Modest success was the "Budakeszi Gyerekköztársaság", which was a pioneer experiment at the beginning. Despite it nearly devastated by the political fight around it, a few minor successes emerged from it (Hungary's only child bookstore works here with great success). Szentendre's trial as becoming the town of women was a failure because the lack of money and will (for example wider parking places for women was rather a marketing gag than a settlement shaping power).

Recently more and more settlements realized that complex and overall solutions to develop the settlements economy are performing better than single separated ideas. These programs look further than the "Integrált Városfejlesztési Stratégia" (Integrated Settlement Development Strategy), which was created by obligation of measures. For example: Nagyvázsony (Kinizsi program), Sülysáp (Települési Értékközpont Rendszer), Újfehértó (Innovatív Foglalkoztatás Támogató Program), Budakeszi (CIBUFE – Települési Minimum Program).

5. The effect of devices matrix

As we could see in practise of the local economy development, obvious matching of devices and area of effects are rare. The eventually or consciously evolved combination of pattern of effect is various. The effect of devices matrix helps to review this (Table 1). Each line of the matrix represents devices what belongs to the local government's functions, and we can find the PESTEL analysis research area in the columns. An "x" in a cell means that through the selected line the government can affect the area by its stock of devices.

Table 1 The pattern of effects of the local government's system of devices

Environmental factor (effect) / Local government function (device)	**Political**	**Economic**	**Social**	**Infrastructural**	**Ecological**	**Legal**
Political	x	X	x	x	x	x
Norm-maker	-	X	x	x	x	x
Proprietorial	-	X	-	x	x	-
Magisterial	-	X	-	x	x	-
Procurer	-	X	-	-	-	-
Employer	x	X	x	-	-	-
Communicator	x	X	x	-	-	-

Source: author's own construction
Note: *Founding of the system of indicators expressed by numbers.

After the qualitative analysis of correspondence, the purpose of the research is to define indicator numbers to describe each line, column and cell, further how to define the system's actual and desired states and changes expressed by numbers. In the interests of define the further direction of the research I examine the boundaries and possibilities of mathematical modelling. During the work out of the system of indexes each index has to be suited to the system of conditions (SMART - Suitable, Measurable, Accesable, Realistic, Timely). Accordingly, applied indicators have to be suitable to featuring the analysed attribute, and also measurable and available. Used data have to be actual and substantive.

Table 2 The sections of system of index (Contractions as in the text)

Environmental factor (effect) / Local governmental function (device)	**Political**	**Economic**	**…**	**Effect-specificindicator (ESM)**
Political	SZM_{PP}	SZM_{PG}	SZM_{PH}	ESM_P
Norm-maker	SZM_{NP}	SZM_{NG}	SZM_{NH}	ESM_N
…	SZM_{EP}	SZM_{EG}	SZM_{EH}	$ESM_{...}$
Effect-specific indicator (HSM)	HSM_P	HSM_G	$HSM_{...}$	ASM_1 ASM_N

Source: author's own construction

Table 3 The system of indexes of the settlement's development

Type	Code	Description	Note
ASM	M_1	Average salary per person [Ft/person]	Indicator what shows the economic power of the population
	M_2	Government income/population count x 1000 [Ft/1000person]	Index-number of the settlement's government's economic power
	M_3	Number of the economical organization/ population count x 1000 [db/1000person]	Index allude to economic activity
ESM	E_{P1}	Delegate corps (Kt.) numbers of resolutions and statutes/year [ps]	Searching the activity of the Kt., the viewpoint of the review is slightly relevant
	E_{M1}	Material +Developmental expenditures/ population count x 1000 [Ft/1000person]	Index allude to procurer's potential of
	E_{M2}	Material-Public works + Developmental expenditure/ population data x 1000 [Ft/1000person]	Like previous but corrected the applied public works costs
	E_{K1}	Number of clicks on the homepage/year/ population count x 1000 [ps/1000person]	Efficiency of e-communication
	E_{K2}	Number of newspaper circulation/year/ population count x 1000 [ps/1000person]	Intensity of the printed media using
HSM	H_{G1}	Local industrial tax's income/ population count x 1000 [Ft/1000person]	Index number of profitability of the local economical organization
	H_{T1}		Tax-payer's index
	H_{T2}	Number of place-hunters/employable population x100 [%]	Employment data
	H_{I1}		
	$H_{Ö1}$	Selectively collected tight waste /all s. waste x 100 [%]	
	$H_{Ö2}$	Wastewater piped by a common-canal/ Quantity of the supplied water x 100 [%]	Tensile the toxic
SZM	S_{PP1}	Changing in the mayor's support	It could be interesting because of the authority
	S_{PG1}	Central supports + by means of the self-government obtained tender[Ft]	Could show the lobby-power
	S_{PT1}	Number of the local civil organizations	The local population allude to activity
	S_{PI1}	Infrastructural investments [Ft]	The effect of the political will and willing enforcement
	S_{NT1}	Social expenditure allude by a local decision /all working expenditure[%]	Shows the resources of social goals
	S_{NJ1}	Number of the reviewed local statute/ all local statute x 100 [%]	Index indicator what shows the low creation and the flexibility of making lows
	S_{TG1}	Self-government's GT's own income/ GT's all income x100 [%]	Producing income throughout bound services
	S_{TI1}	Investment of infrastructure-development /population count x1000 [Ft/1000 person]	Infrastructural development money /1000 person
	S_{HG1}	HIPA income/HIPA assessment x 100 [%]	Efficiency of the magisterial tax collecting
	S_{FT1}	Number of the general-employed / number of place-hunters x 100 [%]	Efficiency of informal and social employment

Source: author's own construction

Applicable indicators can be grouped by their specific:

- Unspecific indicators (ASM): The characteristics of the local economy's condition or changes. But neither the reasons nor the influences of the changes can be identified by the help of them.

- Device-specific indicators (ESM): It shows the forthcoming changes to the given arrangements. Influences can't be identified precisely.
- Influence-specific indicators (HSM): Suitable indicator for analyzing complex arrangement systems' pattern of effects.
- Selective indicators (SZM): Indicator suitable to show individual arrangements and how they affect changes in the area of effect. The Table 2. helps understanding the system of indexes.

It would be desirable to provide a more complete system for the selective indicators, in which the researching of the ESM and HSM indicators and combining them by using appropriate mathematical formulas can help. However, I think that it is not realistic and not appropriate to develop a 100% specific indicator system.

In the third table (Table 3) I review the indicators based on the criteria system above. In the current workflow the enumeration cannot be complete or filtered, however it might be good for to show the direction of the train of thought. So far, the enumeration is similar to a structured brainstorming.

In the future, the list will be expanded, then each created indicators will be checked according to the SMART criteria system. Most of the indicators will be projected for 1000 people, in order of the comparability of the settlements. The impact of the economic development could be demonstrated by the time series analysis of the indicators.

6. Conclusion

In excuse of the shaped statement system the local government's device – effect matrix was made, which can be capacitated for planning and analysing. On the basis of the principled index-number system, it is possible to work out a more particular indicator table and by means of those gauges and methods necessary data are available. By the help of the indicator system the efficiency of the economic developmental action becomes measurable, and the effects of devices on each other can be researched. The planning process can be supported by modelling the changes and the departmental matrix can support several specialities (social factors, tourism and hygiene) systematic development.

Henceforth we have to detail the device system at least one layer down and improve the index-number system. With the expanded index-number system's help the synergistic and

competitive effects of the different devices, and the device's influence on the environment can be presented.

We have to make the wrought system adapted to a functional service. In this role the right device system has to be worked out for the presentation of the desired goal state and for the prognosis for the wrought measure packages' prospective effects. Further on this model can be qualified not just for developing economy but for supporting several factor's development.

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3. Knowledge-based Urban Development, as a New Development Paradigm

Imola Rittgasszer

A region's main goal is to provide its residents all the factors needed to develop a high standard of living. The level of life quality is affected by many factors such as the quality of the environment, the security, the quality of available services, thus mapping the performance of a region is complex and multifactorial process. These factors are summarized in the concept of knowledge-based urban development (KBUD), which aims to increase the region's competitive edge, the attraction of highly skilled human resources and investments, and support the people of the region in reaching high standard of living and welfare.

The primary purpose of this study is to review the theoretical background of the knowledge-based economy, and the detailed description of the concept of KBUD in various aspects. The study[1] *also summarizes and evaluates the most important international benchmark examples related to the application of this concept. Moreover, the study attempts to map the dimensions of KBUD to achieve a model that illustrates the concept of this concept. This model could provide an opportunity to determine the main trend lines of concentration processes detectable in our country.*

Keywords: knowledge, concentration process, knowledge-based urban development

1. Introduction

Definition of the knowledge based economy and the demarcation of the main characteristics of it have been the major research topic for economists since many years, as it is important to understand the new social and economic phenomena of the XXI. century to get the ability of quick and effective responding to changing and transforming economical processes. In our days researchers often use such expressions as, “knowledge”, “information”, “innovation”, “research and development”, “knowledge-based society” to describe the determining phenomena of the present age. These terms are closely linked to the novel economic model of XXI. century, that is called knowledge-based economy. Experts observe these decisive phenomena basically in technical, technological, economic and social aspects or they aim to find relationship between these areas or reveal effects on each other.

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The paper first reviews the main criteria of the knowledge-based economy, a new economic model that was developed as a result of events determining our everyday life. It then describes the knowledge-based urban development concept, which is a new development paradigm is being applied, and seeks to test the performance of complex areas. Then it describes the concept of knowledge-based urban development, which is scored as a new development paradigm that seeks to test the performance of complex areas. In addition to the theoretical approach, the study presents a benchmark example and evaluates the knowledge-based urban development concept to the city of Helsinki, which can serve as a model for the Hungarian regions.

2. Knowledge-based economy

Description of the knowledge-based economy mostly can be found in the disciplines of economic policy or business. The first attempt for giving exact definition can be found in an OECD document published in 1996, titled "*The Knowledge-Based Economy. Science, Technology and Industry"*, that states knowledge-based economies are „those economies which are directly based on the production, distribution and use of knowledge and information" (OECD 1996, p. 7.).

According to this definition those economies can become a knowledge-based economy in which manufacturing processes are based on the production, utilization and distribution of information and knowledge. Based on Oslo OECD Manual it is defined as follows: *„knowledge-based economy is reflected in the trend in OECD economies towards growth in high-technology investments, high-technology industries, more highly-skilled labour and associated productivity gains. Although knowledge has long been an important factor in economic growth, economists are now exploring ways to incorporate more directly knowledge and technology in their theories and models. It reflects the attempt to understand the role of knowledge and technology in driving productivity and economic growth. In this view, investments in research and development, education and training and new managerial work structures are key"* (OECD 2005, p. 28.).

This definition expresses the presence of background processes affecting the economic environment and the importance of interaction between different economic sectors, which are essential to achieve the common goal, the growth.

According to the study of Yigitcanlar and Lönnqvist published in 2013 in the knowledge-based economy the knowledge is the key factor of economic growth and social development, furthermore it plays a crucial role in the improvement of competitiveness of companies and urban regions as well. Additionally it can be stated, that the competitive advantages of urban areas arise not only from cheap labor and natural resources, but the knowledge is beginning to come into foreground as a special resource. The better a region can utilize its knowledge resource to develop new and innovative products, easier it can respond to challenges result from the knowledge-based economy (Yigitcanlar – Lönnqvist 2013).

Although a number of documents (DTI 1998, Kok 2003, OECD 2005, WB 2007) and publications (Leadbeater 1999, Foray 2004, Leydesdorff 2006) deal with the description of background processes of today's economy, uniform definition has not been created yet. One possible reason for this shortage may be that, regions having different conditions and competitiveness, should built their own knowledge-based economy in different ways, making it impossible to formulate a standard definition for all countries and regions.

After summarization of definitions found in the reviewed studies about knowledge-based economy the following conclusions can be made: The term knowledge-based economy arises from the realization of the significant impact of knowledge and technology on economic growth, where the most important key factor of economic growth and productivity is the knowledge. Knowledge intensity and dynamic development of high technology are essential for the knowledge-based economy, as they are determining factors of growth at fields of wealth, performance and employment. Further characteristic is the existence of interaction between the various economic sectors, which promotes the spreading and more integrated application of knowledge. The criterion of calling an economy “knowledge-based economy” is not only the presence of knowledge as a base of the economy, but the knowledge-based society as well, as one cannot function without the other.

The idea of knowledge-based economy can be found in several economics trends (Lengyel 2008). The endogenous growth theory emphasizes the outstanding role of technology, knowledge, human resources and innovation and analyzes the economic growth by explicit modeling of technical development and human resource accumulation (Lucas 1988, Romer 1990). The endogenous growth theory, contrary to the neoclassical growth model, handles knowledge, technical and technological development and innovation not as an exogenous factor, but as an endogenous, internal element (Carpenters − Varga 2000), through which the economic growth is primarily described and explained. The theory emphasizes the crucial role of human capital in growth, which, however, has to reach a critical level in order

to generate growth. In addition, the rate of technological development is determined by the quality of the existing knowledge base and the growth of knowledge producing, creative workforce. According to the model, the spatial diffusion of knowledge and technology leads to increase in productivity. The prominent role of knowledge in economy is underlined by Adam Smith as well in his theory about the benefits of the division of labor and specialized knowledge (Smith 1992). In 1980 Schumpeter published the work *"The Theory of Economic Development"*, in which he designated innovation the driving force of the economy (Schumpeter 1980). From all these it can be stated that in today's knowledge-based economy beyond the traditional factors of production, as natural resources, capital and manpower, a new factor of production, the knowledge also shows up. Furthermore, the conclusion can be drawn that the mapping of knowledge-based economy by indicators cannot be accomplished by the involvement of a few randomly selected indicators, but a complex, multivariate analysis should be applied in these studies.

3. Knowledge-based urban development

In recent decades the role of dominant cities increased both in countries having industrialized or newly industrializing economies, the generation and utilization of knowledge became increasingly localized (McCann – Faggio 2009). The predominance of service-oriented activities and increasing rate of highly qualified labor force is characteristic to dominant cities. Basically, the development trends of cities differ from each other, but a trend emerges in which a number of cities orientate towards the knowledge-based rather than the resource-driven fields of industries.

Yigitcanlar and Lönnqvist (2013) agrees Asheim's view that in recent years city regions focus not on the development of business environment but the environment that is necessary for the highly qualified human resources. They attempt to create a living space that is able to attract and retain talented people, creating the analytical, synthetic and symbolic knowledge base of the region in this way. Namely, the knowledge-based development essentially determines the growth path of a city. This raises the question of what type of improvements are needed to make a city closely integrated into a knowledge-based economy? What kind of city development concept should a city apply in order to create and improve a knowledge-based economy? The concept model of knowledge-based urban development may provide answers to these questions.

According to Knight (2008) the knowledge-based urban development is such a social learning process in which the knowledge capital is utilized in the development of a sustainable urban region. Kunzmann (2008) characterize the knowledge-based urban development concept as a collaborative development framework that provides guideline to the public, private and academic sectors in the make up of future development strategies that attract and retain talent and investment, as well as to the creation of knowledge-intensive urban and regional policies (Kunzmann 2008).

Foremost Perry (2008) interpreted the knowledge-based urban development from different perspectives, in which the knowledge and the relevant territorial unit are taken into consideration with different weight. When KBUD is defined as a process, the knowledge is set into the center and changes are evaluated as results of external influences. In case of product-driven KBUD, similarly to a process-driven, the knowledge is in the focus and territorial unit does not play a key role, it is a so-called peripheral factor (Perry 2008). However, in the third approach, that is also called acquisition -guided one by Perry, knowledge is just one factor in the development process, which appears embedded to economic, cultural and social processes. According to Perry (2008) combined use of these three dimensions of KBUD may elicit proper, satisfactory results.

According to Fernandez-Maldonado and Romein (2010) for sustainable KBUD the right balance of the following factors should be present: economic quality that depends on the formation of proper business climate that is required to establish welfare. The second is social-societal quality which is based on an open and positive social environment. The third dimension is environmental quality, and the last one is the quality of organization. The organizational quality depends on the coherence of the urban region and the effective interaction between the main stakeholders that manifest in factual initiatives and projects.

Yigitcanlar (2011) looks upon KBUD in the era of the global knowledge-based economy as a novel development paradigm, which is aimed to create economic prosperity, social order, sustainable environment and appropriate municipal governance.

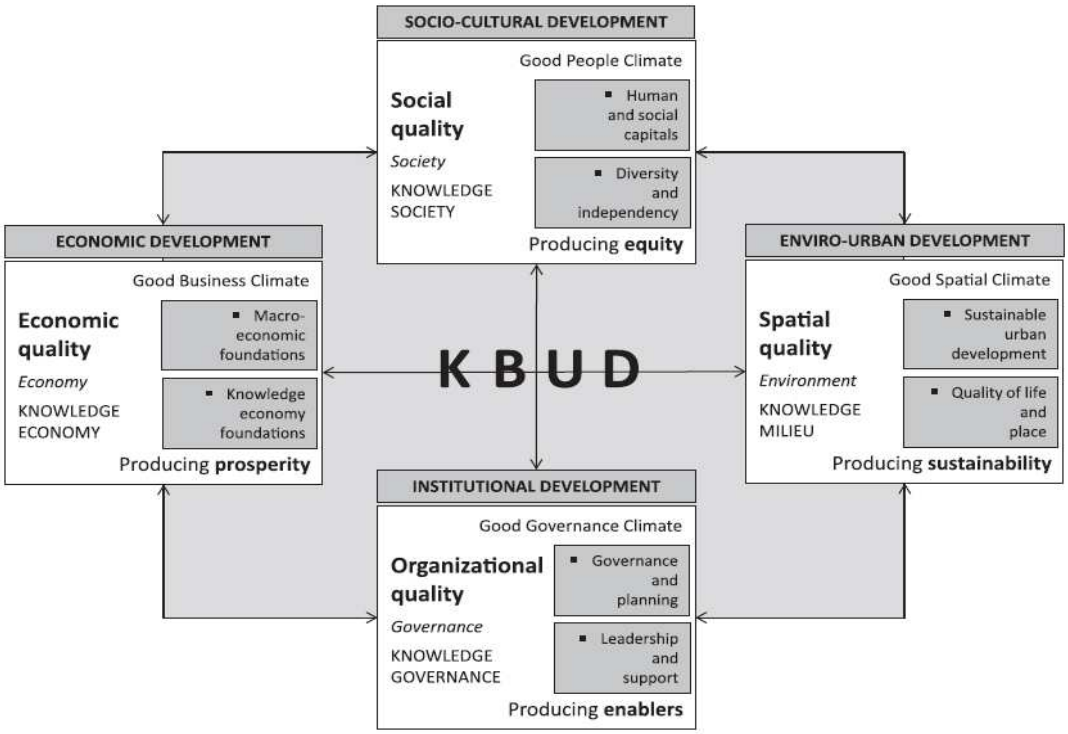
4. Practical application of knowledge-based urban development concept

The study of Fernandez-Maldonado and Romein titled *"The role of organisational capacity and knowledge-based development: the reinvention of Eindhoven"* is an extraordinary example for the practical application of KBUD. From the study of Romein and Fernandez-Maldonado (2010) we can come to know that Eindhoven has been an industrial

city for more than 25 years, thus as an impact of deindustrialisation processes the decline of economy and society was detectable. However, in the past few years Eindhoven has become to be one of the leading technology headquarters of the Netherlands. This result is mainly due to the recognition of the central role of the knowledge and technology, and the implementation of innovations based on these factors. The authors emphasized that the solution of socio-spatial problems and the propensity for closer cooperation between public and private sectors also contributed to the success. In Eindhoven KBUD concept such enhancements and projects have been realized, that made the city attractive for the settlement of highly qualified human resources and technology.

Similarly excellent benchmark example is the study *"Benchmarking knowledge-based urban development performance: Results from the international comparison of Helsinki"* by Yigitcanlar and Lönnqvist. According to Yigitcanlar and Lönnqvist (2013) in the focus of KBUD is the economic, social and territorial (both the built and the natural environment) development, as well as institutional development, that supports the realization of improvement in the prior three areas. These four development perspectives form the framework of the knowledge-based urban development (Figure 1).

Figure 1 Conceptual framework of KBUD



Source: Yigitcanlar and Lönnqvist (2013, p. 3.)

The *economic development* pillar of KBUD is aimed to set the endogenous knowledge capital in the center of economic activities, because according to this concept knowledge is not a supplementary, exogenous factor of development, but a key resource. This perspective efforts to create the optimal business environment and builds a knowledge-based economy that achieves prosperity through strong macroeconomic and knowledge-based economic ground.

The *socio-cultural* pillar aims to improve skills and knowledge of the residents towards the personal and social development of the community. This pillar seeks to develop a knowledge-based society, with main characteristics of strong human and social capital, acceptance of diversity and social equality.

The third pillar of KBUD is the *environmental and urban (enviro-urban)* development. The aim of it is finding the harmony between preservation and improvement of built and natural environment. It also aims to create a strong, knowledge-cluster based development path, that is environmentally friendly, high-quality, unique, and sustainable. The third pillar is the dimension of sustainable urban development and creation of quality of life.

The fourth, final pillar is the *institutional development*. This aims to form a group of local actors who - in cooperation with stakeholders - determine the common vision of future and plan the strategy needed for the implementation of it. Thus, the fourth pillar is about to develop a knowledge-based governance, that can provide the effective institutional background that is essential for design and implementation of the development.

As a result of coordinated development of the four dimensions an appropriate social, environmental, institutional and economic climate will develop, that will create economic prosperity, social equity, and environmental sustainability.

Yigitcanlar and Lönnqvist (2013) applied the KBUD evaluation model for Helsinki. In the past decade Helsinki has been one of the fastest growing regions in Europe, which can be attributed to several factors. Helsinki has high-quality public services, outstanding primary and secondary education, and lets space for innovation and knowledge creation. In addition, high levels of local democracy and governance is characteristic to the city, which is based on a system of progressive taxation and universal social allowances. In addition its society is diverse, that indicates a high level of tolerance. Yigitcanlar and Lönnqvist examined not just the region of Helsinki in their study, but extended it to a comparison with further cities, that matched the following criteria (Yigitcanlar – Lönnqvist 2013):

- Top 20 position in the 2011 Global Competitiveness Report
- Top 20 position in the Global Innovation Index

- Shortlisted for or received a Most Admired Knowledge Cities Award
- Data availability in English and comparability of the political and governance systems

Table 1 KBUD/AM model structure and indicator descriptions

Indicator categories	Indicator sets	Indicators	Descriptions
Economic development	Macro-economic foundations	Gross domestic product	Gross domestic product (GDP) per capita in USD purchasing power parities
		Major international companies	Number of global top 500 companies located
		Foreign direct investment	Ratio of international share in foreign direct investments
		Urban competitiveness	Global urban competitiveness index ranking
	Knowledge economy foundations	Innovation economy	International city ranking in innovation economy
		Research and development	Ratio of research and development expenditure in GDP
		Patent applications	Patent Cooperation Treaty patent applications per million inhabitants
		Knowledge worker pool	Ratio between professionals and managers and all workers
Socio-cultural development	Human and social capitals	Education investment	Ration between public spending on education and GDP
		Professional skill base	Ratio of residents over 18 years with tertiary degree
		University reputation	World university rankings
		Broadband access	Ratio of access to fixed broadband subscribers per capita
	Diversity and independency	Cultural diversity	Ratio of people born abroad
		Social tolerance	International country tolerance ranking
		Socio-economic dependency	Ratio between the elderly population and the working age
		Unemployment level	Ratio of unemployment
Enviro-urban development	Sustainable urban development	Eco-city formation	International city ranking in eco-city
		Sustainable transport use	Ratio of sustainable transport mode use for commuting
		Environmental impact	CO2 emissions in metric tons per capita
		Urban form and density	Population density in persons per sqkm
	Quality of life and place	Quality of life	International city ranking in quality of life
		Cost of living	International city ranking in cost of living
		Housing affordability	Ratio between GPD per capita and median dwelling price
		Personal safety	International city ranking in personal safety
Institutional development	Governance and planning	Government effectiveness	Level of government effectiveness
		Electronic governance	International city ranking in e-government
		Strategic planning	Level of KBUD strategies in strategic regional and local development plans
		City branding	International city ranking in city branding
	Leadership and support Level of institutional and managerial leadership in overseeing KBUD	Effective leadership	Level of institutional and managerial leadership in overseeing KBUD
		Strategic partnership and networking	Level of triple-helix and PPPs and global networking-global city ranking
		Community engagement	Level of institutional mechanisms for community building and public participation
		Social cohesion and equality	Level of income inequality in gini coefficient

Source: Yigitcanlar and Lönnqvist (2013, p. 6.)

Based on these guidelines, the following cities were studied: Boston, San Francisco, Birmingham, Manchester, Melbourne, Sydney, Toronto and Vancouver.

The evaluation was performed by the KBUD Assessment Model (KBUD / AM). The KBUD / AM is an evaluation model based on indicators, that consists of 4 categories of indicators, 8 indicator sets and 32 indicators (Table 1). The four development pillars of KBUD appear as the four main categories of indicators, the 32 indicators were selected according to the relevant literature.

The authors point out that during the collection and selection of indicators they had to face difficulties as few achievable, relevant and reliable indicators are available, thus sometimes they needed "creative solutions".

In the first step of the analysis min-max normalization has been applied, then the resulting values were used as weights for the same model according to the following equations:

$$I_{MEF} = \sum_{i=1}^{n} \frac{MEF_i}{n}; \quad I_{KEF} = \sum_{i=1}^{n} \frac{KEF_i}{n}; \quad I_{HSC} = \sum_{i=1}^{n} \frac{HSC_i}{n};$$

$$I_{DI} = \sum_{i=1}^{n} \frac{DI_i}{n}; \quad I_{SUD} = \sum_{i=1}^{n} \frac{SUD_i}{n}; \quad I_{QLP} = \sum_{i=1}^{n} \frac{QLP_i}{n};$$

$$I_{PL} = \sum_{i=1}^{n} \frac{GP_i}{n}; \quad I_{SP} = \sum_{i=1}^{n} \frac{LS_i}{n}$$

where I corresponds to the indicator score and MEF, KEF, HSC, DI, SUD, QLP, GP and LS subscripts represent the indicator sets. After that, the indicator domain scores are calculated by the following equation:

$$I_{EcoDev} = \sum_{i=1}^{n} \frac{EcoDev_i}{n}; \quad I_{SocDev} = \sum_{i=1}^{n} \frac{SocDev_i}{n};$$

$$I_{EnvDev} = \sum_{i=1}^{n} \frac{EnvDev_i}{n}; \quad I_{InsDev} = \sum_{i=1}^{n} \frac{InsDev_i}{n}$$

where I corresponds to the indicator score and EcoDev, SocDev, EnvDev and InsDev subscripts represent the four development indicator categories (Yigitcanlar – Lönnqvist 2013). As final step, this formula was used:

$$I_{KBUD} = \sum_{i=1}^{n} \frac{KBUD_i}{n}$$

where I corresponds to the indicator score, KBUD corresponds to the KBUD composite indicator and KBUDi corresponds to each of the development indicator category scores (Yigitcanlar – Lönnqvist 2013).

Nowdays, a wide range of theoretical and empirical agreement can be observed in that relation human capital, research and development (R&D), technological development and innovation should be regarded as the key impact factors of complex productivity of production and thus the economic growth.

As a result of the studies conducted in all the four dimensions the order of city-regions has been outlined. Based on the examination of the economic development pillar, the authors conclude that Helsinki is at the third place out of the regions, which is due to the research-development and the presence of the knowledge society. However, Yigitcanlar and Lönnqvist points out that local actors should give more attention to the development of business climate, that would attract foreign investors resulting the maintenance and stimulation of local innovation processes. Helsinki is the worst place regarding to the area of socio-cultural development, which can be explained by relatively low university reputation and a lower number of skilled migrants compared to the other investigated urban regions (Yigitcanlar − Lönnqvist 2013).

The functional advantage of KBUD Assessment Model analysis is that the model can map the strengths and weaknesses of a region from different aspects, which can serve as a base for the set up of the practical design process.

The strength of the study is the detailed description of the required steps for the practical application of KBUD Assessment Model and explores the potential difficulties in the analysis as well. The authors point out that the most controversial part of the analysis is always the compilation of the involved set of indicators, as in many cases not all the necessary relevant data are available for testing a model, so compromises should be accepted.

The adaptation of KBUD Assessment Model for Hungarian regions provides the possibility of a novel knowledge-based region mapping method, which may lead to conclusions that reveal further development directions for the observed regions.

5. Conclusion

According to recent studies, human capital, research and development (R&D), technological development and innovation should be regarded as the key impact factors of complex productivity of production and thus the economic growth. In today's economy, the human resource has increasing central role in the development of a country or a region. The primary reason for this highlighted role is the high degree transformation of advanced societies to so-called knowledge-based economies, in which the high education of human

resources is considered as a crucial factor of economic growth. However, apart from the development of knowledge society it is necessary to develop the economic, environmental and governance areas as well. This multi-dimensional development can be presented by the knowledge-based urban development concept, the functional relationships can be evaluated by the KBUD Assessment Model. The study showed example for practical application of the model through the city of Helsinki. The set of indicators used for the analysis provides a suitable base for the investigation of Hungarian regions, especially the suburban centers, that will be the next step of this research.

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4. Teleworking Houses as Key Opportunities of Jobseekers in the Less Developed Regions of Hungary

Henrietta Finna - Flóra Földi

The opportunities of employment in the countryside are nowadays limited in the agriculture and in the industries; however, the service sector may foster equal opportunities of employment in the urban and rural areas as well. Non typical forms of employment, such as teleworking, part time working, definite period contracts, hiring out employees might be tools for increasing the level of employment in the disadvantaged regions. Also, distant or remote working is getting more usual at workplaces, as a global trend, and another possible solution for providing employment opportunities in the countryside is teleworking.

A teleworking center or teleworking house is a well-equipped office separated from the location of the company and it is independent from the company's organizational structure as well. The employees perform the work and communicate with the company by using IT assets and electronic channels.

The paper aims to answer the question whether teleworking centers have a reason for being based on the experiences with the existing teleworking houses, evaluating the advantages and disadvantages, and finally, whether establishing new teleworking centers would be advantageous and in which region they shall be established in.

The methodology includes analyzing the utilization and future potential of the teleworking houses; analyzing project plans of the telework centers and execution, preparing the SWOT analysis and conducting individual interviews with project leaders of the telework houses and the Hungarian Telework Association. The paper concludes on the competitiveness of the teleworking centers and makes recommendations whether establishing new teleworking houses could act as a tool of regional development and for increasing the level of employment in Hungary.

Keywords: unemployment, teleworking, teleworking center, regional development.

1. Introduction

Some of the regions of Hungary suffer from high level of unemployment, because in the countryside there are limited opportunities of employment in the agriculture and in the industries. However, the service sector offers additional employment possibilities in some urban and rural areas as well. Therefore it is needed to explore new employment policy tools that foster increasing the level of employment and one of these tools can be employing teleworkers in teleworking centers. These centers have positive impact on regional development: migration towards the capital and bigger cities may slow down because

inhabitants can be employed locally; and these centers can attract new employers that results in money flowing into the region that fosters further development (Forgács 2011).

Currently there are two teleworking centers in Hungary in Örkény and Nagykőrös, both of them are located in Central Hungary. The Hungarian Telework Association introduced the National Teleworking Center Program in order to facilitate establishing 3-4 teleworking centers in every region of Hungary, therefore it is a valid question whether new centers shall be opened and in which regions. This paper discusses the current challenges of employment in Hungary, teleworking as one of the potential solutions, the history, advantages and disadvantages of the teleworking centers, and a conclusion whether new centers shall be established.

2. Methodology and hypotheses

Methodology primarily focuses on reviewing and analyzing secondary sources, for example databases of the Hungarian Central Statistical Office, Labor Market Intervention Center of Budapest and market researches conducted by Ipsos and Bellresearch. Moreover, secondary information was used, for instance the internal feasibility documents and project documents of the Hungarian Telework Association, and of course, relevant papers of the topic. Secondary data and information have been supplemented with primary research, i.e. analyzing information derived from the secondary sources and conducting interviews with the representatives of the Hungarian Telework Association and the teleworking center in Nagykőrös). A SWOT analysis is presented, and requirements of establishing a new teleworking center are also reviewed.

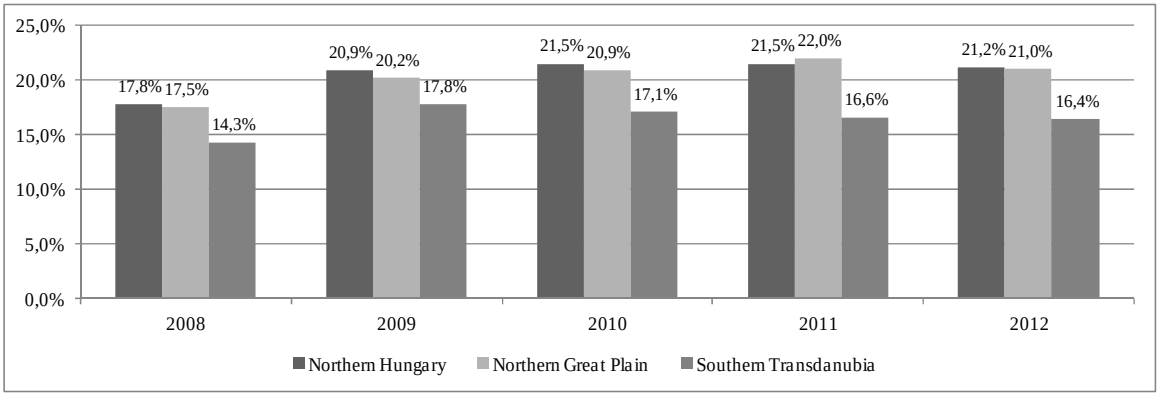
By exploring the experiences and utilization of the centers, we hypothesized that opening new teleworking centers would be reasonable in the underdeveloped regions of Hungary.

3. Challenges of employment in Hungary

Compared to the EU countries, the number of unemployed and economically inactive people is very high in Hungary, more than 40% of the people in working age (15-64 years), according to Hungarian Central Statistical Office (HCSO 2013a). The (registered) unemployment rate exceeded 11% in Hungary for the period of December 2012 – February 2013 (HCSO 2013b). Moreover, 45.6% of unemployed people have been looking for a job at

least for a year. The monthly average percentage of registered jobseekers compared to the economically active population in Hungary was 12.6% in 2012. It was the highest in Northern Hungary region (21.2%), followed by the Northern Great Plain (21.0%), while it was 16.4% in Southern Transdanubia (National Employment Service, 2013). Figure 1 shows the unemployment rate in these NUTS-2 regions[1] from 2008 to 2012.

Figure 1 Unemployment rate in NUTS-2 regions with the highest unemployment from 2008 to 2012



Source: author's own construction based on National Employment Service (2013)

4. Active employment policy tools and teleworking

Based on the above, there is a vital need for increasing employment all over Hungary, but especially in the regions with unfavorable positions. Active employment policy tools are used with the purpose of reducing unemployment. These tools include for example fostering training and education, supporting activities that help improving the level of employment and those that endeavor keeping existing workplaces, mobility support, labor market services and subsidizing communal workers. Active employment policy tools also include fostering non-typical employment forms. Typical or regular employment forms usually mean full time employment with indefinite contract and regular working hours (eight working hours per day, five days per week, fixed workplace etc.). Non-typical forms (i.e. fixed-term employment contracts, part time jobs, tasks performed on a contractual basis, teleworking) are different in some aspects, – in these types of employment the conditions of work (work time, work schedules, workplace) are agreed among the parties (HTA 2011a). In the international

[1] „The NUTS classification (Nomenclature of territorial units for statistics) is a hierarchical system for dividing up the economic territory of the EU. NUTS-2 includes the basic regions for the application of regional policies" (EC 2013).

Telework Enhancement Act of 2010, telework is defined as "a work flexibility arrangement under which an employee performs the duties and responsibilities of such employee's position, and other authorized activities, from an approved worksite other than the location from which the employee would otherwise work and pass the results of work with help of electronic tools (via email) to the employer" (Public Law 111-292. 5 USC 101, 2010). In Hungary, teleworking has an additional legal requirement: it can be performed only in employment, and it has to be reflected in the employment contract as well (Hungarian Labor Code 2013). According to the Hungarian Telework Association (2011a) the types of teleworking can be:

- according to the place of work: home office (working from home at least once per month), mobile teleworking (the place of work changes according to the tasks, i.e. in case of sales persons), performing work from a teleworking center,
- according to the frequency of teleworking: occasional (case by case for some tasks, i.e. reporting), partial teleworking (pre-defined as 2-3 days per week), continuous. International studies consider at least1 day/month frequency as teleworking.

Table 1 shows the number of recommended new teleworking jobs that were to be created in 2005-2010, based on the reports about the winner companies by the Labor Market Intervention Center of Budapest[2].

Table 1 Number of offered new teleworking jobs at the winner companies by NUTS-2 regions

NUTS-2 regions	2005	2006	2007	2008	2009	2010	Total
Central Hungary	473	266	333	447	550	336	2405
Central Transdanubia	37	9	12	9	4	26	97
Northern Great Plain	140	141	196	64	47	41	629
Northern Hungary	72	56	60	58	38	28	312
Southern Great Plain	25	192	146	19	36	24	442
Southern Transdanubia	8	41	4	1	22	24	100
Western Transdanubia	14	10	23	2	4	54	107
N/A	3	0	5	0	0	0	8
Total	**772**	**715**	**779**	**600**	**701**	**533**	**4100**

Source: author's own construction based on Labor Market Intervention Center of Budapest (n.d.)

[2] Between 2002 and 2010, the Labor Market Intervention Center of Budapest (Budapesti Munkaerőpiaci Intervenciós Központ) was operating a Teleworking Program Office that aimed to promote teleworking and it was participating in elaborating tenders and evaluating applications. The organization was keeping contact with companies, non-governmental organizations (NGOs), municipal governments and chambers.

Most of the winners are from Central Hungary (2405 jobs) and Northern Great Plain (629 jobs). Although the unemployment rate is historically the highest in Northern Hungary, winner companies from this NUTS-2 region had the opportunity to establish only 312 new jobs within 6 years.

These numbers suggest that teleworking has been spread across Hungary, however, studies show that number of teleworkers is still very low (3% according to Ipsos 2012a) and focus was not on the right regions. The Hungarian Telework Association (HTA 2011. p. 29.) has argued that teleworking is not (or not supposed to be) an instrument of social policy, however, teleworking can target some the following groups:

- employees living in an isolated location and cannot commute to work on a daily basis,
- employees having a special knowledge or competence that can be leveraged remotely as well (i.e. IT knowledge for programming, software development),
- employees with proper self-discipline and work ethics – therefore fresh graduates and people being unemployed for a long period of time are not recommended targets.

Teleworking might provide solution for some of the above cases, but it cannot be the only one tool for resolving employment difficulties of these groups. According to the study of Bellresearch (2010), those companies are more likely to implement teleworking successfully that have already had the knowledge and experience with non-typical work assignments.

5. Teleworking centers as tools of regional development

Based on the research conducted by Ipsos (2011b) for Reuters News with 11,383 teleworkers from 24 countries, emerging markets (Middle East and Africa, Latin America and Asia-Pacific) have a leading role in teleworking. The poll shows a very low (3%) penetration rate of teleworking in Hungary (European average is 9%) (Ipsos 2011a). Despite of the lack of opportunities, 37% of Hungarian employees would opt for trying teleworking (Ipsos 2011a). On the other hand, Hungarian employers are averse from this new model, most likely because they believe that their activities, tools and equipments, availability of information do not make the job suitable for teleworking (Bellresearch 2010). Some of these concerns can be resolved by the teleworking centers (i.e. offering tools and equipments), while some others have to be looked at with a new approach.

A teleworking center or teleworking house is a well-equipped office separated from the location of the company and can be accessed only by the teleworkers. The (permanent or

temporary) employees perform work and communicate with the company by using IT assets and electronic channels. Jobs being accomplished from a teleworking center usually include white collar roles, for example administrator (i.e. recording data, digitizing), market researcher, call center roles, webpage designer of IT software developer, translator or direct marketing specialist. A teleworking center may function as an external site (for business continuity plans), as a satellite office or as a training site as well. The teleworking center is usually operated by a third party, i.e. municipal government or NGO (HTA 2011a). Infrastructure set-up can accommodate the needs of the company.

The first teleworking center in Hungary was opened in October, 2007 in Örkény, Central Hungary NUTS-2 region (Pest County). In 2009, a National Teleworking Center Program that aimed to open 3-4 teleworking houses per regions had been introduced (Forgács 2010). The Program had been successful in a tender called "Joint development of telework infrastructure for the establishment of cross-border opportunities of corporate telework". Within the confines of this project, two additional teleworking centers were established in the end of 2011: one in Nagykőrös[3]in Central Hungary NUTS-2 region (Pest County), and one in Szőgyén, Slovakia[4]. The Hungarian Telework Association has selected and trained approximately 300 individuals for being able to work from the teleworking centers. Table 2 shows the most important characteristics of these two teleworking houses.

Table 2 The main characteristics of teleworking houses in Örkény and Nagykőrös

	Örkény	**Nagykőrös**
Opened at	October 2007	December 2011
Location	50 km from Budapest, 40 km from Kecskemét	90 km from Budapest, 15 km from Cegléd and Kecskemét
Owner of the property	Municipality Government of Örkény	Bács-Kiskun County's Association of Job Seekers
Number of workstations and additional functions	22 workstations in 4 premises	15 workstations in 4 premises, 1 meeting room plus civic center and labor advisory office.

Source: author's own construction based on HTA (n.d.a.)

One of the biggest advantages of teleworking centers is that they are able to increase the employment rate without establishing industrial centers or significant investments into transportation and properties. According to Forgács (2011), if a region realizes this opportunity and creates proper environment for companies for leveraging teleworking, then

[3] The project was part of the Program under the European Territorial Cooperation Objective, co-funded by the European Regional Development Fund (ERDF)
[4] This paper focuses on the teleworking centers in Hungary, in Örkény and Nagykőrös.

the money flowing into the region leads to economic growth (push-effect). This process can be driven centrally as well, by defining the centers of growth and developing them consciously (pull-effect).

6. Evaluating of teleworking centers in Hungary

Based on the experiences of teleworking centers' operation, we prepared a SWOT analysis to point out the opportunities for developing some new houses in unfavorable regions (HTA n.d.a, HTA n.d.b, HTA 2011, Ipsos 2012a, Forgács 2011, Forgács 2013, Duxbury et al. 1998, Paprika 2013, Taylor – Kavanaugh 2005, Tóth 2013). Figure 2 shows the summary of the SWOT analysis.

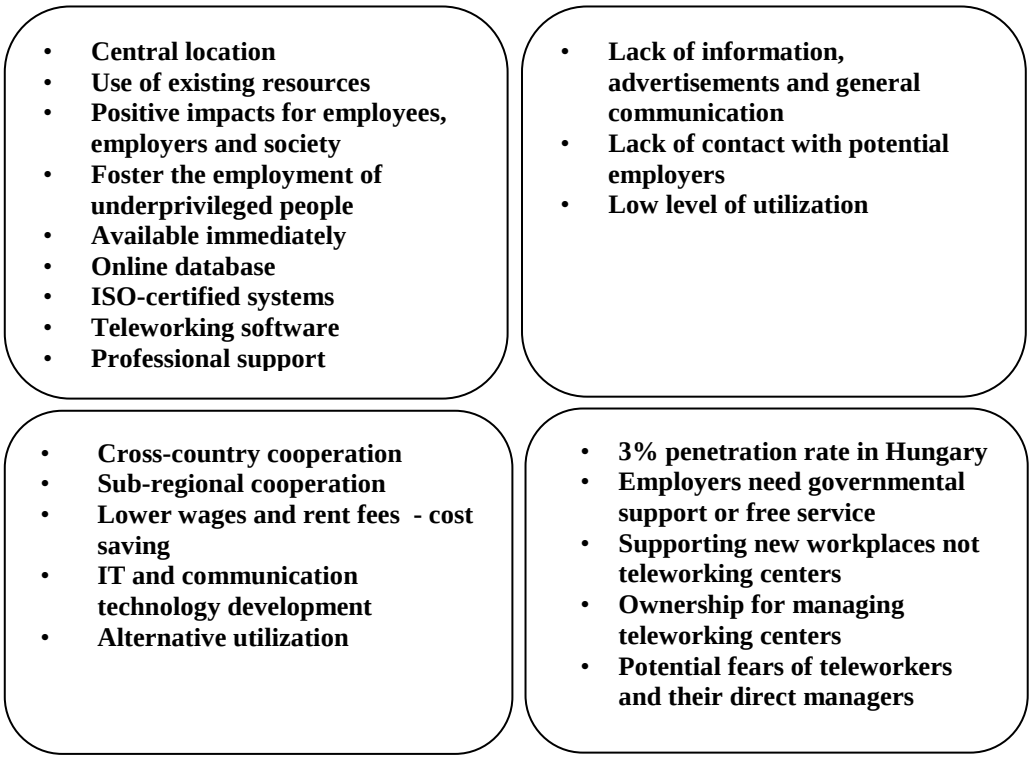
Strengths:

- Central location that is easy to be reached by the employer and the teleworkers as well; close to the capital or bigger cities and higher educational institutions.
- Teleworking centers use existing resources, i.e. infrastructure (buildings, roads and internet) and network of supporting organizations and NGOs.
- They have also social impacts since they are eco-friendly (reduced travelling causes less use of energy) and reduce healthcare costs. Centers provide perspective to employees, develop them and strengthen community (teleworkers can spend more time with their families and community instead of commuting).
- Teleworking has a positive impact on being more effective and efficient (by focusing on performance and empowering employees), it reduces work related stress and attrition, increases work-life balance, job satisfaction and loyalty.
- Teleworking centers foster the employment of disabled people[5], unemployed or underprivileged people (i.e. employees over the age of 45) – it improves the equality of employees, results in cost saving[6] and regional differences can be reduced.
- Immediate availability: teleworking centers provide employers with fully equipped office (PCs, hardwares and softwares, video conference room, IP-based phone center).

[5] For example the teleworking center in Nagykőrös is accessible by employees with disability as well and there are available disabled employees in the region.
[6] i.e. on the rehabilitation contribution

- Employers can select potential employees from an online database of selected and trained candidates or use their own recruitment and selection processes to hire teleworkers. This initiative is also cost efficient for the companies.
- ISO-certified information security management system has been implemented in teleworking centers. Special attention is paid on data privacy and data management.
- Teleworking software supports employers in organizing and supervising tasks of the teleworkers and evaluating their performance.
- Professional support is provided by the experts of the Hungarian Telework Association (HTA) and other NGOs.

Figure 2 SWOT analysis of teleworking centers in Hungary



Source: author's own construction based on HTA (n.d.a), HTA (n.d.b) HTA (2011), Ipsos (2012a), Forgács (2011), Forgács (2013), Duxbury and his co-authors (1998), Paprika (2013), Taylor – Kavanaugh (2005), Tóth (2013)

Weaknesses:

- Information about the teleworking centers is not widely communicated: on the central webpage (www.working-centers.eu) the latest news are from 2011; teleworking centers are not promoted on the website of all municipality governments.
- Continuous and intense communication and contact with the potential employers was planned but is not in place or can be further strengthened.

- The current level of utilization of the teleworking centers is low. In 2007-2008, the center in Örkény was utilized almost fully (for call center and telemarketing jobs), but later on this opportunity was ceased and since then there is lack of interest. In Nagykőrös, the teleworking center was opened in December, 2011, but the project was fully completed (i.e. preparing marketing materials) only in the end of 2012. Therefore this teleworking house has not yet been utilized at all.

Opportunities:

- Cross-country cooperation between Slovakia and Hungary, sharing best practices, developing new and innovative methods together, involving regional stakeholders.
- The cities of teleworking centers are members of sub-regions therefore more potential employers and teleworkers can be reached.
- Wages and rent fees are 20-40% lower in other cities than in the capital, therefore employers can save costs immediately by using teleworking centers.
- IT and communication technology developments and coverage create new opportunities for the centers as teleworking jobs are based on this technology.
- Alternative utilization of teleworking centers can take place (trainings, meetings, project offices, substituting offices for business continuity plans).

Threats:

- Teleworking is not widely spread (3%) across Hungary and Hungarians prefer well-known, good practices compared to new situations with high risk.
- Without reducing the service fees of the teleworking center or without governmental support employers are unable to employ teleworkers.
- Governmental initiatives and tenders (i.e. GOP-2012-3.5.1/B) aim to support creating new workplaces, not leveraging existing teleworking centers. Teleworking as a way of organizing work assumes trust between the employer and the employer. If a company is encouraged to establish new workplaces as a teleworking job, the employer has to hire new employees where the trust has to be established first and it is even more difficult in a teleworking environment.
- Questions regarding ownership appeared: in the model the local organization is responsible for managing (i.e. attracting employers, educating potential teleworkers about teleworking) the center, however, Hungarian Telework Association has the necessary expertise not the locals, but the Association has no capacity for it.

- Some of the teleworkers might be afraid of the new situation, i.e. because they might get isolated; there is less feedback on their performance, less chance for getting promoted. They have fewer opportunities to participate in trainings; and their colleagues also might be ungrateful. These fears are mainly caused by lack of information and no experience with teleworking.
- Some of the employers (direct people managers) might face new challenges as well: they might lose their power, influence and importance or they might feel that their managerial skills (i.e. communication, leadership style, etc.) are outdated. These fears are also mainly caused by lack of information and few experiences with teleworking.

A study was conducted in March, 2011 with 37 individuals and 45 companies within the framework of the HUSK/0901/1.1.1/0140 tender[7] that was supported by the European Union. This study was designed to measure the success of the teleworking center in Örkény and collect recommendations for further improvement and for the new centers to be opened (Carurbis Kft. 2011). Key conclusions of the study are shown in Table 3.

Most of the teleworkers were employed for 3-6 months only (temporary solution), neither them, nor the employers consider it as a long term option. Some of the companies' expectations have been met in the meantime, i.e. creating a database of trained and selected employees, preparing a cost calculator, offering additional services. Companies also emphasized the importance of corporate social responsibility (CSR); it can be one of the unique selling points of teleworking centers in the marketing and communication plan that is still to be created.

The teleworking center in Nagykőrös had been opened in the end of 2011; however, the project was just fully implemented in the end of 2012. Therefore, as explained by István Tóth (president of Bács-Kiskun County's Association of Job Seekers) and by Tamás Forgács (president of the Hungarian Telework Association), the teleworking center in Nagykőrös is not utilized at all at the moment, as the promotion has to be strengthened.

[7] "Joint development of telework infrastructure for the establishment of cross-border opportunities of corporate telework"

Table 3 Key conclusions of the study about the teleworking center in Örkény, 2011

<table>
<tr><th></th><th>Feedback from teleworkers and potential employees</th><th>Feedback from companies</th></tr>
<tr><td>Advantages of teleworking and the center</td><td>Improved work-life effectiveness, shorter commuting time and saving money, working more effectively.</td><td>Delivering tasks in a fast and cost efficient way; CSR approach; suitable for call center support, digitizing, market research, etc.</td></tr>
<tr><td>Disadvantages of teleworking and the center</td><td>Teleworkers are mainly from Örkény – the center cannot involve employees from the subregions.</td><td>Teleworking center does not have enough references.</td></tr>
<tr><td rowspan="5">Recommendations, ideas, needs</td><td rowspan="4">Further developing the IT infrastructure (to avoid frequent technical problems with the computers).</td><td>Need for additional support (i.e. wage subsidy) from the government to leverage teleworking.</td></tr>
<tr><td>Database of trained and selected employees to be created.</td></tr>
<tr><td>New services, i.e. temporary or permanent offices, online library, trainings, presentations, organizing events.</td></tr>
<tr><td>SMEs[8] could also be target of the centers.</td></tr>
<tr><td colspan="2">Awareness building, additional marketing and PR activities, communicating advantages by presenting real life examples and calculations of potential cost savings.</td></tr>
</table>

Source: author's own construction based on Carurbis Kft. (2011)

To sum it up, currently the two teleworking centers of Hungary are not sufficiently utilized, well-known and most of the companies beware of implementing this new way of organizing work.

7. Establishing new teleworking centers

The outcome of the above presented SWOT analysis, the conclusions and recommendations of the study conducted in Örkény and the feedback from Nagykőrös all have to be taken into account when opening a new teleworking center. Furthermore other important components influence this decision too. According to Forgács (2011), hard and soft location factors can be identified.

Hard location factors are for example transportation, taxes, subsidization, labor market; soft factors include economic environment and partnerships, higher education, social infrastructure and human factors. Some of these criteria of establishing new teleworking centers are summarized in Table 4.

[8] Small and Medium Enterprises

Table 4 Hard and soft criteria of establishing teleworking centers

Hard criteria	Soft criteria
Costs of establishment and maintenance (i.e. teleworking center coordinator, overhead expenses)	Educational background of candidates, availability of higher educational institutes
Available property that can be used for this purpose	Openness, willingness and ability to gain new skills
Costs of the employers (service fee, lower wages, local taxes and contributions)	At least user level IT knowledge (or even higher for IT-relates jobs, i.e. software developer)
Employment and unemployment	Languages spoken
Governmental strategy and support, tenders	
Availability of IT and communication technologies	
Location (closer to bigger cities) and transportation	
Logistics	

Source: author's own construction based on Forgács (2011)

According to Bagley and his co-authors (1994), those teleworking centers have the biggest potential to develop that are in the rural areas and that are used by only one employer; however, centers with more employers are more likely to survive, because they are not dependent on the success of only one company.

Although the National Teleworking Center Program aimed to open 3-4 teleworking centers per regions (Forgács 2010), considering the reality of the existing centers, opening further ones is not recommended at the moment. Instead, focusing on awareness building for both potential teleworkers and employers, promotion, partnering with companies, studying potential barriers and eliminating them would be advised.

8. Conclusion

Teleworking can be a useful tool for increasing level of employment in Hungary. Several actions have been in place for fostering teleworking, for examples wage subsidy provided for companies, tenders of the Labor Market Intervention Center of Budapest, but all of them subsidized Central Hungary the most, while Northern Hungary and the Northern Great Plain have the biggest problems with unemployment. Also, the existing teleworking centers are located in Central Hungary, the most developed region with the lowest unemployment rate, while there are no centers in other regions. Therefore it seems to be logical to establish teleworking centers in Northern Hungary and the Northern Great Plain as well, and later on in other regions of Hungary too. However, the very low current utilization,

misconstrued tenders (where the focus is on Central Hungary and tenders aim to support creating new workplaces, not transforming jobs into teleworking), employers' and employees' lack of knowledge and resistance against new methods makes it questionable. This also led to the rejection of the hypothesis, which means that establishing new teleworking centers is not recommended, instead, it is advised to subsidize the utilization of the existing teleworking centers, supporting education on advantages of teleworking, sharing best practices and building partnerships among teleworking centers and employers. Exploring these factors raises new research questions that can be answered by further studies. In our opinion, new centers could be opened when the position of the existing ones has been stabilized and the hard and soft factors have been justified in the underdeveloped regions.

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5. The Economic Program of De-growth and a Possible Connection with Capability Approach

Judit Dombi

The program of de-growth which mainly belongs to Serge Latouche strengthened in the recent years as an alternative answer to our global economic, social and environmental problems. The agents of the theory highlight that everybody on Earth, especially the North – USA, Europe, etc. – should reconsider their values to be followed and review all the problems caused by continuous growth. Lists of social and environmental reasons – like growing poverty and the nature's finite carrying capacity – show that this growing pace cannot be sustained.

This alternative suggests that the 'developed world' should decrease its ecological footprint and focus on real well-being and justice. We work and consume too much and it seems that our happiness does not mainly depend on these factors. We should look back[1]*; learn from former societies to be able to honour nature and each other too. Certainly it would not mean the level of ascetics but society itself should determine what should be called enough. At this point the role of local level is getting valorized.*

Amartya Sen's capability approach shows similarities with the program of de-growth. They both concentrate on serious moral questions and attempt to redefine well-being. Hence it is worth to compare the two theories, and show some points where they might learn from each other.

Keywords: de-growth, capability approach, well-being, protection of environment

1. Introduction

Nowadays we can hear from many sources that we have more and more serious environmental and social problems on our planet. As an answer, an alternative direction – the program of de-growth – appeared, that the continuous growth is not desirable. I introduce environmental and social reasons why it is necessary to stop growth, then shortly reasons why the mainstream still would like to grow. As another way, I highlight the main points of the de-growth program and make an attempt to find a possible connection with Amartya Sen's capability approach.

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2. Why is it necessary to stop growth?

We – economists – study and teach that a given activity is worth to do if its gained incomings are bigger than its costs and expenditures. So – as Serge Latouche (2011) and Herman Daly (2005) say – why is it not so obvious that if this kind of basic thesis has not been true on global level for several decades, we should stop growth? In microeconomics a given activity is optimal in case marginal revenue is equal to marginal cost. Then it is not worth to do it additionally. When analyses switch to macroeconomics these notions disappear and none speaks about optimal quantities, costs and benefits, and 'when to stop'-rules.

Western civilization has a lot of unsolved problems and nowadays' ongoing recession just reinforces this statement. One part of the world is eating too much which causes various diseases, while the other part is starving. One part produces consciously a huge amount of various kind of garbage while the other – defenseless – part gets it. Latouche (2011) asks questions like: Where did we – 'civilized people' – come from and where do we go, what is our goal? We have been living on credit: if everybody on Earth lived an American lifestyle we would need six planets. Do we really think that we can grow endlessly in a finite world?

For thousands of years people were fighting against the nature's forces. In the recent centuries – especially in the recent decades – it seemed that humanity won more and more battle. Today we know that this aim hides inside the destruction of the environment and we are part of the environment, not outsiders. We have more and more power and we show more and more irresponsibility to destroy ourselves. Furthermore Hankiss Elemér (1997) draws our attention that surprisingly we usually destroy our society which we created for our own safe, and allow ourselves poverty, brutality and fear. What should happen that we really consider our problems?

We have to repose the discussion onto new bases. We should make the difference between objectives and methods, and identify the real problem. Latouche (2011) declares that growth is already not sustainable. What we produce and consume cannot be more than the biosphere's supporting capability. Developing new technologies and production methods follow the same logic as before; that 'growth is desirable'. Probably this is not a good method and the aim is wrong. As a consequence, we have to reduce our wasteful consumption. 80% of the products on the market go to the dustbin after only one use which creates an annual 760 kg of household waste per person in the USA only, while 40 kg paper based advertisement goes into the post-boxes. Currently developed countries produce all together 4 billion tons rubbish per year.

Wolfgang Sachs (2005) has a good example to demonstrate the problem. In modern cities, down in the metro stations there are advertising posters. As we recognized the paper-waste, new – so called environmentally friendly – technologies arrived, and by now we can see the advertisements mostly on monitors in video-form. Thus we have the solution for the paper-problem. The discourse about development is deeply full of western convictions like progress, growth or consumption but these might be the problem itself and they distract the attention from our relationship with environment.

In 1949 Harry Truman was the first who characterized the poor countries, the Third World as under-developed territory despite of all their diversity. He explained the leading role of the North – especially the USA – as everybody is going in the same direction. In this sense the South became a competitor, and the North forced them into a treadwheel no matter that their intellectuality, culture and tradition are just the opposite. Contrary to all expectations by the 21st century, after fifty years this divide is just deeper (Sachs 2005).

Latouche (2011) emphasizes that we should get rid of the pressure of growth and focus only on real sustainability and real well-being. For most of us work, growth is not an option; the present economic and social structure is forcing us into it. The continuous purchasing makes us feel the illusion of having achieved something meaningful in life. Apparently we have forgotten what kind of values we are following, what is important for us, what can make us happy and satisfied in our lives.

2.1. The social reasons

Unfortunately in the modern society if someone wants to be famous and respectable in many cases he/she has to expend needlessly and be wasteful. Nowadays those consumptions which are necessary just for life do not represent value but at the same time they do not serve well-being. As Thorstein Veblen (1975) describes usually the aim of these consumptions is not to break from the crowd but to reach a socially accepted honourable limit in quantity and quality as well. This limit is not strict standard but very elastic and can be raised infinitely, or cannot?

As we see ‘the more a man can dispense the richer he/she is’ attitude in the 19th started to disappear and today it seems so absurd (Pataki et al. 2007). A new myth started to spread in the Euro-American civilization saying that we can be happier and more satisfied with more and more material goods despite of all religious and scientific convictions. For example in the USA in the ‘80s one-third of the citizens considered himself/herself happy, exactly the same

proportion as thirty years before although the consumption per person doubled in this period. This means that our happiness depends on other factors such as the quality of human relationships and the scale of relative consumption comparing to others in the society. According to another survey people in countries with very different income-levels (e.g. Japan and Nigeria) feel themselves equally happy. So we always compare our material situation to the other members of the society.

Most of the ordinary commodities can be more or less expropriated. E.g. a family can use a bathroom in common but every member of it can have his/her own one. Siegwart Lindenberg's (2005) model says that we can see the trend that the higher is one's income the more he/she appropriates his/her consumption. But what is so paradoxial in this phenomenon is that with the increasing expropriation people destroy certain forms of social appreciation which they cannot substitute own their own. If everything is totally expropriated e.g. in a family there is no need to share anything, and follow the norms of sharing, after a time the members of it will admit that they miss the 'good old times' when they were less rich but they were more important to each other. So as income is increasing sharing groups are shrinking. At the same time social norms, local traditions, ethnic specialties cannot be held up without them.

It seems that the utilitarian approach – that says widening consumption opportunities raise total utility – cannot explain that the measure of the individual, subjective feeling of well-being did not grow in the last decades in the developed countries (Corrigan 2010, Csigó 2007). If we accept the 'homo oeconomicus' image of man we can only say that people's needs are simply fulfilled. If it's true why do people aspire after bigger cars, houses, etc.? Is it so hard to confess the role of the outside pressure in case of our preferences coming from deep inside? Modern man from a developed country follows all these status-gaining opportunities while in the long run he pays with other sources of well-being: time for more valuable activities, social relations, friends, family and love. Consequently commodities and different social classes are just weapons in this never ending fight. We can create infinite definitions and redefinitions of social status holding up a permanent tension in the society in local, regional, national and international level too.

Beside the social consumption-increasing mechanisms economic ones are also working like advertisements and packaging technologies (Gowdy 2007, Pataki et al. 2007). So the essence is that the determinant part of our shopping claim was not born with us but is a generated one. The continuous getting-fever is probably not a basic characteristic of human nature. Many hunter-gatherer, natural tribes prove this statement. We can and should learn

from former societies. Usually we can see different paintings, pictures about these people portrayed as primitive wilds fighting for their everyday survival but this is what a modern man thinks, not the exact truth. These ancient communities spent much more time for resting, social life, games; they had much more individual freedom as today's man – so they lived a life what now we call well-being. It was obvious to live a peaceful and harmonic life with nature. They did not know social classes and discrimination. It seems that 'homo oeconomicus' with its competition-spirit and rational calculating does not describe the real human nature; it might be just a myth. Although deep inside all of us believe or would like to believe that we are so rational and make consistent decisions, so this kind of human image is like a fiction and it might be just like a religion.

In addition we also explain the present economic structure, the resource-use, the asset- and income-distribution ideologies (Gowdy 2007). The final goal is to be Pareto-efficient; everybody gets revenues according to his/her marginal productivity, no matter if the system is not equitable. In nature tribes social norms controlled that meat has to be equally shared among each members. They did not save any food until anybody is hungry, they did not really care about private possession. So it is not only the market which can produce and distribute goods and services. These hunter-gatherer communities were well-fed, ecologically sustainable, lived an entire life socially and intellectually, tried for equality and had a lot of spare time. Some of them are still alive and operate in this way e.g. in Africa, Australia, Tanzania and North-Canada in spite of they do not live in the friendliest part of our planet. Thus actually we can call them just as rational as ourselves. These societies apply the 'immediate-return' principle which means they live from one day to another; they do not have tools and technologies for storing food. 'Delayed-return' and holding are modern methods, and today we cannot image how to live successfully in another way.

We certainly do not know a lot about these communities and I do not want to over-idealize them but as I mentioned before we can and should learn from them, and think over the principles of living. Economic scarcity is the conception of modern society, and not the obligate attachment of human life, it depends on the generated needs. Work and social life do not have to be separated; people are not robots who are waiting for some for spare-time to live a real life. Individual well-being in connection with individual production is not necessary; members do not have to starve. Relationship with the nature can be co-ordinated where there is no owner and possession. Stock means only shared knowledge, flows are sustainable and enough for well-being. Inequality, sexual discrimination and social insecurity are not natural.

To sum up, human beings are political and social creatures by their nature; not isolated individuals (Fukuyama 2000). People are originally capable for cooperation, altruism and creating social capital. These characteristics are very likely the biggest strengths of human race.

2.2. The environmental reasons

Wolfgang Sachs (2007) declares that even if we admit or not, we approximate the limits of growth even if we have already reached it and now we are just going down. Some of us think that growing can be the solution for our problems by opening new markets for ecologically friendly technologies, some of us think that that is the problem itself. Some of us would like to excuse the North – mainly the USA and Europe – and show that the solution can only come from new northern technologies, some of us would like the North to reconsider its responsibility.

Actually the environment mainly suffers from over-growth and not from the inefficient use of resources or from the over-increment of human race. The structure of growth hinders communities, well-being and destroy environment. In this sense 'sustainable development' is an oxymoron. Sachs (2007) advises that we should ask ourselves the questions: 'What kind of and whose needs?'; 'What is enough?' Those who are pushed to the periphery because of the expanding 'development' – which caused drought, disappeared animals, fenced and ruined fields – have to show up in the urban markets where they have no purchase power, so poverty is all that remains. Hence – in this sense – northern countries are the ones who have to slow down and withdraw as they have much bigger ecological footprint than their territory. According to certain signs many industrial societies overpassed the limits in the '70s from where the increasing GNP did not really raise the standards of living which could mean that an optionally decrease in production might not end up in the decline in well-being.

We cannot say that we were not aware of the problem. In 1962 the book of Silent Spring written by Rachel Carson warned everybody and strengthened environmental protection movements (Sachs 2005). We started to consider the interests of future generations that they also should be able to reach the same level as we do. So again, actually the aim is still not to keep the honour of the nature but the expansion of the present for the future thinking about how to substitute natural capital. Moreover poverty is started to be correlated with the ruin of environment but we should not mix up cause and effect. Protection is not only a management task. Global common goods – Antarctica, oceans, rainforests, Earth's atmosphere and

biological diversity – are especially in danger. The problem is that the price of natural resources is low and depositing the garbage is almost free. Specialization and commerce cause a decrease in agricultural diversity in traditional agro-societies; and many principles do not serve the protection of natural resources. At this point the role of scientists is getting valorized as the barriers can be proved only by scientific results. We should minimize the nature uses per unit of economic output and start a diet to reduce our excess weight. It is not enough to be more efficient as it causes just more use of the given resource – which we call as Jevons paradox – and then the situation is even worth. The number of cars is growing four times faster as the population of the Earth. As Herman Daly (2005) says if a freighter sink because of too much cargo, for us there will be no consolation if it sinks optimally.

Classically consumption can be split into two main types: final and intermediate one. Intermediate consumption means products and services which are used for production. As human beings are also resources with their labor force Inge Ropke (2005) takes the question if there is any final consumption. As people need to eat, rest, study, etc. to be capable for work we can say that these consumptions are also intermediate ones. But we still intuitively stick to the notion of final ones, as a significant group of people have much higher standard of living than what basic needs would require. The problem is that there are vainly ecologically more efficient solutions if the growing consumption cancels them – which we call as rebound effect.

There is a huge amount of freely or incorrectly deposed trash which is poisonous and exceeds the ecological systems' natural anabolic capacity. It takes decades, centuries or more that these radioactive, PCB, CFC etc. materials state their effects causing diseases and global climate change. The losses are significant, irreversible and show asymmetric distribution in time. While revenues come in immediately, costs come up in the future. Clive Spash (2005) draws our attention that positive time preference and net present value at individual level face problems in long term social decisions as future generations' preferences are not included. In this sense inter-generational discount rate and inter-temporal one should not be the same.

Natural carrying capacity is not a static, easily determinable value (Arrow et al. 2005, Latouche 2011). It depends on technologies, preferences, the structure of production and consumption, the variable interactions of physical and biotic environment. It would be senseless to give only one number of it but an overall index would be useful which shows the current measure of economy and its intensity comparing to the biosphere. Losing of ecological resistance potentially causes serious problems as the system will be less capable to hold up human existence, irreversible changes in choice opportunities, growing uncertainties

regarding the environmental effects of economic activity. Our economy has over-grown; people make waste from resources faster than nature produces resources again from trash. The worldwide ecological dept has increased from 70% to 120% from 1960 to 1999, and it is just rising as the lifetime of products is getting shorter and shorter.

To sum up, in simple words something is sustainable if it can be held up in the future which depends on economical, social – including cultural, ethical viewpoints – and ecological factors. Today more and more people agree that growth is ecologically not sustainable, and it seems that neither it is socially. Thus politics in the North have to change the focus from growth to real sustainability and in the South to fair development. It is important to recognize that we should handle differently the notion of growth and development. Hence sustainable development can have a deeper, human, social, ethical, cultural, ecological and institutional meaning (Ekins 2005).

3. Why certain groups like growth?

According to mainstream beliefs every economic activity is predominantly useful, and GDP is a kind of economic quantity which can grow forever (Daly 2005). The main goal is to maximize well-being but it seems that this function has no upperbound so there is no optimal size of economy. Everything can grow and as a consequence, well-being can always be bigger. Technology might be the only barrier of growth but as technologic development supposedly has no limits, growth has neither as substitution is solvable in this way. In this sense environment and eco-system is just a sub-system of economy. Although neoclassical paradigm let forever growth, but does not require it. But it became the common salve for the problems like overpopulation, unfair distribution, inevitable unemployment and environmental pollution also.

Conventional, mainstream theories support capitalism as the best kind of structure which can ever exist and which is natural, inevitable and fit to human nature (Hartwick et al. 2009, Latouche 2011). These theories emphasize growth as they see it as economic development. From this point of view all of these theories – classical, neoclassical, Keynesianism, neoliberal, etc. – work on the same logic. Nonconventional theories – like Marxism, socialism and other radical ones – criticize capitalist structure as it can be ethically questioned but the aim stayed the same: growth. Of course their terminologies are different but from the aspects of goals they are hardly diverse.

Nevertheless it seems that people tend to mix up the notion of growth and development. These notions might have common sections but we should separate them too (Hartwick et al. 2009). The result of development is that everybody has a better and better life, and according to famous paradigms growth is just a method for this aim. Ere now, none proved universally that it is currently the best solution and it really serves the goal. Growth means achieving more and more massive economy and aggregating means taking together everything. If these kinds of indicators are increasing it means that all together everybody is in a better situation. But it is forgotten that they do not handle inequality, injustice, poverty and widening income and territorial differences. Consequently development does not really need growth but rather conditions which are responsible for production's input and output which help the world to be better as a complex – naturally, socially, economically, culturally, politically etc..

4. The way of de-growth

The program of de-growth mainly belongs to Serge Latouche (2011) who says that we can agree that the common aim is well-being. That is another question how we define it but we know several facts. Some of them say that it seems that constantly growing GDP especially in the western civilization does not end up in a bigger proportion of more satisfied and happier citizens as for one reason everybody compares himself/herself to the current social structure, but of course we cannot exclude entirely the importance of GDP (Fitoussi et al. 2009). As technology's marginal productivity is increasing labor's decreasing which causes unemployment especially among less qualified labor force. Plus there is the paradox that in the North it does not cause less working hours and more spare time only much revenue. Hence consumption is larger and larger too while it pollutes environment. Taken everything into account humanity should think over the followed values, produce and consume less or at least stop at this level. If everybody worked less, unemployment and pollution would also reduce, spare time would increase, human relationships could be looked after better. We usually forgot that we do not live to work but to work to live.

De-growth is a slogan for a totally different logic to shake up everyone from the charm of growth and put economics back to its pure agent, to the biosphere. E.g. according to a survey 90% of the American companies admit that a new product could not be sold without marketing campaign, 85% agree that in most cases advertisements convince people to buy totally unnecessary products, and 51% state that advertisements persuade consumers to buy

the kind of products that they do not want in fact; and the result is just more and more waste. E.g. 500 ships take the water monthly with electronic waste towards Nigeria without any health standards. Society itself should tell where the sufficient and acceptable measure of consumption is; what should be called enough.

The real problem is not over-population but whether we are capable to distribute the available resources equally. The concrete utopia of de-growth – as Latouche (2011) calls it – cannot be managed without cultural revolution and without redefining the whole political life. The program suggests eight coherent, key factors – called as the eight R's angelic circuit – to build the new society: reevaluate, re-conceptualize, restructure, redistribute, re-localize, reduce, reuse and recycle. I summarize shortly the meaning of the R's:

- Reevaluate: highlight and follow the value of justice, responsibility, solidarity, intellectual life and the respect of democracy.
- Re-conceptualize: redefine e.g. poverty and richness, scarcity and abundance.
- Restructure: production and social relationships should follow the changes in value but it is a big question if it can be achieved within the frame of capitalism.
- Redistribute: the access to goods and natural heritage on global, social and intergenerational level also.
- Re-localize: It has a special role with the slogan of 'Think globally, act locally!'. Local needs should be fulfilled from local production, and we should focus on local culture and local politics. An ecological society should be built from smaller territories, bioregions which are in harmony with the ecological system and strive for reducing negative externalities and energy consumption. In this case small does not necessarily mean physically but rather an identity where members would like to take care of the local essence and spirit. There are promising initiatives like 'new communities' network' in Italy.
- Reduce: production, consumption, risks, working hours, transportation.
- Reuse, recycle: longer product lives, environmentally friendly technologies.

First of all the program could be implemented in the field of food-supply, and later economic and financial self-sufficiency. To sum up, regionalization means less transportation and producing consumption, transparent production chain, inspiration for sustainable production and consumption with the reformation of taxation system and with a new direction of technological innovations and scientific research goals, the reduction of dependence from multinational companies and flow of capital, increasing safety in all sense, so briefly the

resettlement of economy to the local communities. As a result, it would defend the environment as the found of any economic activity, decrease unemployment, strengthen involvement, integration and solidarity, bring forth more democratic economic attitude, open opportunities for developing countries and Third World, reduce working hours, stress and ameliorate population's health status. So the program of de-growth would not mean retrogression, poverty and abjection, but better from less.

Africa can have a special role as they do not have to reduce their ecological footprint which does not mean that growth-based society should be built there but rather they can avoid the impasse of growth. Maybe the South should take the first step in another direction and resist intellectual colonization. We cannot solve the problem of poverty by growth as poverty is caused by growth.

5. De-growth and capability approach

Capability approach is linked to Amartya Sen who got the Nobel-prize in 1998 and has a great effect on science economics today too. Sen (2003) defines the process of development whereby those freedoms broaden which people actually enjoy. This approach is up against the closer interpretation of development which determines it as the increase of GDP and personal incomes, industrialization, technological progress or modernization of society.

By development the sources of lack of freedom should be terminated like poverty, oppression, intolerance and abuse. The different forms of freedom are both means and objectives too. Briefly Sen (2003) examines five main types of freedom: political, economic, social, transparency guarantees and livelihood safety. The means can be changed to functionnings – valuable doings and beings – which are the set of capabilities. As a result people can live a life which they can consider valuable with good reason. So the focus should be switched from utility, income and assets to another concept of well-being.

Although Sen (2003) is not directly against growth and modern capitalist markets, there are many common points with the program of de-growth as he says growth in itself does not legitimize anything. So first of all Sen (2003) writes about development consistently and not about growth. Both theory concentrates on real well-being, what good is for man, which cannot be measured with aggregate indicators like GDP, the picture should be tinted and values should be re-considered. They point out serious problems in modern world like poverty, starvation, diseases and health problems.

The main difference between the two theories that the program of de-growth is a transformative theory. It would like to restructure the current system and reach well-being without growth in production and consumption. On the other hand capability approach stays in the present economic structure and says that we should look in another direction and redefine well-being.

While utilitarian approach focuses on the equality of income (GDP) parallel with individual happiness, Sen (2003) highlights the equality of capabilities. De-growth's aim is 'good life' also but the question of justice is still opened (Muraca 2012, Sen 2003)

Table 1 Similarities and differences of the de-growth program and the capability approach

	De-growth program	**Capability approach**
Main focus	Transformative theory, well-being without growth in production and consumption	Redefining well-being
Main problems	Destruction of nature, poverty, injustice	Poverty, heath problems, injustice
Responsible for problems	The North	Not specified
Measure of	The criticism of utilitarian measures of welfare	
Means	Restructure the current system and de-growth	Widening capabilities
Equality of	Not specified	Capabilities
Participation in decisions	The importance of local level	
The role of technology	The problem itself / Technological regime change is needed	Not specified

Source: author's own construction

The solutions show similarities as de-growth and capability approach emphasize the importance of participation in decision-making, and the role of local level too. Sen (2003) does not nominate certain capabilities which should be widened – although Martha Nussbaum does – and in line with this de-growth entrust the determination of limits to local societies, but names – not is exact order – values to be followed. Technology should also change the focus. Although Sen (2003) does not specify the role of technology, there are some researches which say that it should be developed to improve capabilities (Oosterlaken 2009). For the program of de-growth technology is mainly the problem itself – this is a pessimistic view – but the optimistic view says a technological regime-change is needed. Sen (2003) does not nominate who is responsible for problems, while Latouche (2011) considers the North (USA, Europe, Australia, etc.) is. Capability approach concentrates mainly on social problems, but de-growth

focuses on the entire Earth, maybe first to the nature, then or parallelly to society. However both theories centre serious moral questions.

Table 1. summarizes the comparison of the theories. Maybe in the future it would be more effective to think and then act along both theories to solve our problems while modernity might be exceeded.

Finally I would like to take some shy suggestion what could learn the two theories from each other. Capability approach should be more sensitive to environmental problems, identify more precisely the role of technology and identify the stakeholders, so who is responsible for the problems and who should start to act. The program of de-growth should make more elaborate concepts on welfare and its measurement.

6. Conclusion

What is sure is that our world has too many stressful unsolved problems which we cannot overlook. We can argue about if it is possible to handle the situation within the frame of capitalism. We would force open doors with the criticism of capitalism; Marx did it once already but without the criticism of growth and taking the ecological coercive forces into account. It seems that we should exceed modernity. Of course there are so many unanswered questions how to achieve the goals peacefully but we should not wait too much and dandle ourselves in dreams that everything is fine and we cannot follow other logics with intelligence and moral sense, and build better systems for ourselves – as Latouche (2011) says – with artistry.

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PART TWO

Clusters and Regional Competitiveness

Lengyel I. – Vas Zs. (eds) 2013: *Regional Growth, Development and Competitiveness*.
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6. The Impact of Regional Operational Programme on the Economic Development and Regional Competitiveness of North-West region of Romania. Partial Findings and Emerging Challenges

Anca Dodescu – Lavinia Chirilă

Romania, one of the newest European Union members, benefits from grants in order to implement projects in accordance to European Union's policies that should finally lead to economic development and social welfare. The regional development policy is one of the most important policies of EU that aims to reduce development discrepancies between regions by financing the less developed ones. Even though the aim of the EU funds is clearly defined, the actual impact of their implementation is difficult to appreciate despite the efforts that have been done up to present in order to identify the most appropriate evaluation method. In Romania, one of the programmes created in order to reduce regional disparities is the Regional Operational Programme (RO Programme), financed through the European Regional Development Fund (ERDF). However, trying to determine the economic and competitive effects of structural funds implementation encouraged the authors of the present paper to choose an ex-post evaluation, by applying a questionnaire to the beneficiaries of EU funding through RO Programme from the North-West development region of Romania. The main questions that the paper tries to answer to are How effective are the EU money spent in Romania? Which are the biggest obstacles in the process of EU funds implementation? Do the EU funds contribute to the increase of regional competitiveness?

The quantitative research taken in the purpose of identifying the impact of using EU non-refundable over economic development and regional competitiveness has been done on the basis of conceiving and applying of an on-line research and monitoring questionnaire, called Questionnaire of evaluation of the RO Programme impact on the North-West region of Romania, sent to be filled in to every RO Programme funding beneficiaries in the North-West region – the sample was formed of 155 beneficiaries who had implemented projects by 01 October 2012.

Keywords: regional economic development, regional competitiveness, North-West region, Regional Operational Programme

1. Introduction

The evaluation of regional policy has been given increasing attention in the European Union (EU), mainly due to the wide variety of projects and programmes with European funding, there is a growing emphasis in political debate on the need for evidence on the performance of EU cohesion policy, because policymakers want to know "What works?" and "Why?", especially *in the Central and Eastern Europe* (Warsaw Conference 2009, Armstrong – Taylor

2000). Scientific literature devoted to methods of evaluating public policies in general, EU regional policy, in particular, was enriched substantially in the last two decades (Patton 2002, Pawson 2002, Furubo et al. 2002, Nutley et al. 2003, Boyle – Lemaire 1999, Connell et al. 1995, Van der Knaap 1995, Wholey 1986, Shadish et al. 1991). Also, different methodologies with greater or lesser complexity have been developed by regional development agencies, research centres, institutions, government bodies, NGOs etc. in order to assess regional projects and programmes carried out in different countries, mainly due to on-going evaluation experiences of EU cohesion policy for 2007-2013 and ex-post evaluation of the period 2000 – 2006 (Varga – in't Veld 2011, EC 2013, 2012a, 2012b, 2010).

The Regional Operational Programme 2007-2013 (ROP) is one of the seven Operational Programmes established for Romania through the National Strategic Framework of Reference (RMRDT 2012). The main ROP objective is the equilibrate development of all the Romanian regions through exploiting the regional and local development potential, focusing on urban growth poles, improving regional and local transport infrastructure, improving social infrastructure, supporting the development of regional and local business environment, sustainable development and promotion of tourism, in order to transform these regions, and especially those lagging behind in more attractive areas for investment, tourism and residential.

Even though the aim of the EU funds is clearly defined, the actual impact of their implementation is difficult to appreciate despite the efforts that have been done up to present in order to identify the most appropriate evaluation method. However, trying to determine the economic and competitive effects of structural funds implementation at regional level encouraged the authors of the present paper to choose an *ex-post evaluation*, by applying a questionnaire to the beneficiaries of EU funding through RO Programme, beneficiaries from the North-West development region of Romania. The main questions that the paper tries to answer to are *How effective are the EU money spent in Romania? Which are the biggest obstacles in the process of EU funds implementation? Do the EU funds contribute to the increase of regional competitiveness?*

2. Methodology

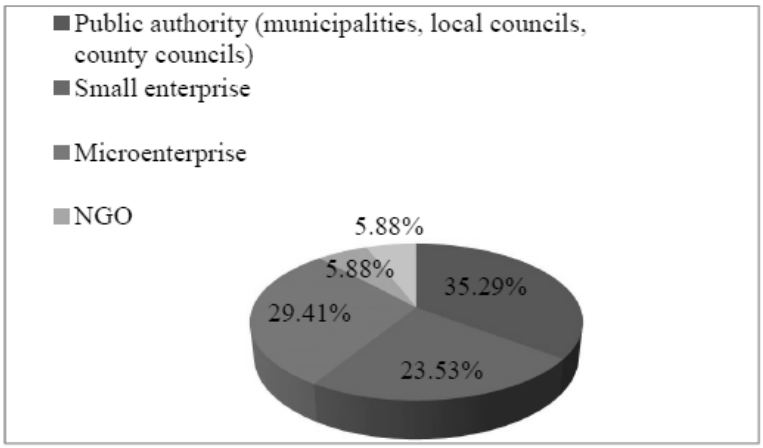
The quantitative research taken in the purpose of identifying the impact of using EU non-refundable over economic development and regional competitiveness has been done on the basis of conceiving and applying of an *on-line research and monitoring questionnaire*, called *Questionnaire of evaluation of the RO Programme impact on the North-West region of Romania*, sent to be filled in to every RO Programme funding beneficiaries in the North-West region – the sample was formed of 155 beneficiaries who had finished implementing projects by 01 October 2012.

The questionnaire comprises 45 questions, grouped by topics such as: *general economic profile of the beneficiary organisation, the main activities developed by the organization, general information regarding the project financed through RO Programme, the impact of the project implemented through RO Programme, information regarding impact over competitiveness and innovation of the organization, its products or its production process*. Data were analysed using SPSS software by testing the assumptions made in the field literature presented in the paper. Data collection was done by field research taken by the research team during February - April 2013. The sample includes recipients of funding from both the public sector, 35 beneficiaries (municipalities, local government units, etc.) representing 22.15% of the total sample, and from the socio-economic environment, 8 non-governmental organizations (associations, foundations, parishes etc.) representing 5.06% of the total sample and 115 beneficiaries were representatives of business environment, representing 72.78% of the respondents.

3. Partial findings

The results presented below are partial because the questionnaire is until now in process of implementation. The sample of respondents to date consists in the largest proportion of private companies 52.94% (small enterprises - between 10 and 49 employees, and microenterprises - from 0-9 employees) followed by public authorities 35.29% (municipalities, local councils, county councils) and other categories of public institutions 5.88% and NGOs 5.88% (Figure 1).

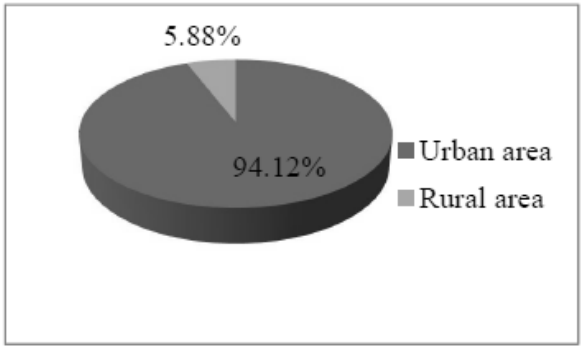
Figure 1 The type of organization funded by ROP 2007-2013 in the North-West region



Source: author's own construction

94.12% of the questionnaire respondents are based in urban areas while 5.88% are located in urban areas, which show a greater openness towards accessing European funds allocated through ROP of institutions / economic entities operating in urban areas, although this program addresses both the urban and rural environment (Figure 2).

Figure 2 The headquarters of the organizations funded by ROP 2007-2013 from the North-West region



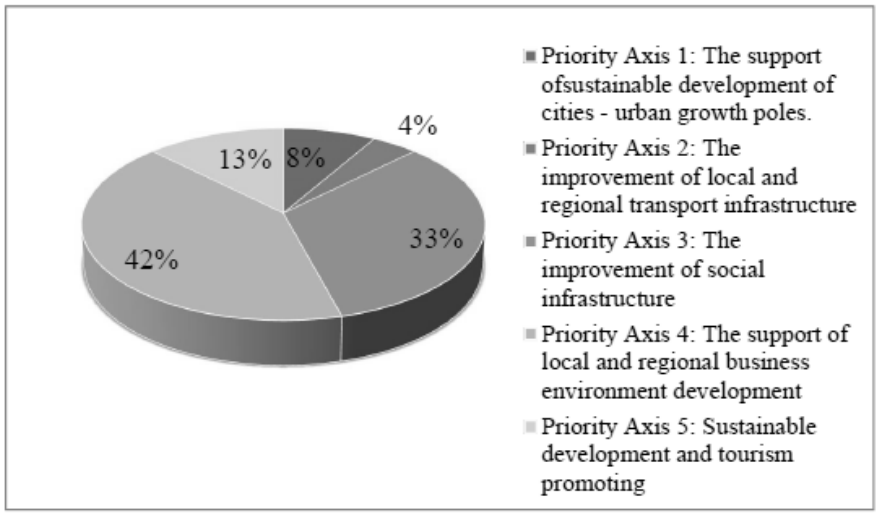
Source: author's own construction

The main fields of activity in which the questionnaire respondents perform their activity are the following: Activities specific to the local public administrations (municipalities, county councils); Activities of business and management consulting; Engineering activities and related technical consultancy; Catering – restaurants; Construction of residential and non-residential buildings; Activities of achieving software on demand (customer oriented software); Activities

of advertising agencies - advertising production, signage, branding, sales or spatial shops and corporate offices planning; Dental care activities; Activities of religious organizations, Wholesale of machinery for construction; Maintenance and repair of motor vehicles; Residential care center for the elderly, etc.

Among the projects implemented by 01.10.2012 through ROP, whose representatives have replied to the questionnaire so far are: *The rehabilitation and modernization of Body Clinic - Outpatient Municipal Clinical Hospital "Dr. Gabriel Curteanu" Building B, Oradea; The rehabilitation, modernization and expansion of day center for people with multiple sclerosis in Oradea; The rehabilitation and extension of the building in Louis Pasteur Street No . 42, for the objective: Ivy Day center for children with Down syndrome; The rehabilitation upgrading and equipping of the "Andrei Saguna" High School of Oradea City; The revitalization of the Oradea fortress to introduce the tourist circuit: Fortress of Oradea, European resort - Phase I; The rehabilitation, modernization, expansion and equipment of "Avram Iancu" School, grades I-VIII, Building B and Building C, Oradea; The development of business and management consultancy at SC ORGMAN SRL Baia Mare; The use of new technologies in SC PREFCON SRL Zalau Salaj – the guarantee of efficiency and competitiveness in design; Qubiz-"Quality Business" in IT outsourcing in North West; The acquisition of performing dental equipment for the endowment of DENTAL CLINIC LLC; The rehabilitation and modernization of ambulatory Corp. 'F' - Hydrotherapy of the rehabilitation of the Clinic Hospital of Cluj-Napoca*, etc.

Figure 3 The proportion of the priority axes accessed through ROP in the North-West region



Source: author's own construction

The classification of respondents in terms of priority axes accessed through the implemented projects in the North-West region of Romania is shown in Figure 3. Most of the respondents, respectively 42%, have received funding through ROP under Priority Axis 4 dedicated to supporting business development and particularly micro-enterprises. The second place in terms of access grade, among respondents, it is occupied by Priority Axis 3 dedicated to improving social infrastructure. The third place is occupied by the Priority Axis 5 designed to promote sustainable development and tourism, while the fourth is occupied by Priority Axis 1, which aims to support sustainable development of cities as growth poles. Finally, on the last place is Priority Axis 2 dedicated to improving regional and local transport infrastructure. Therefore, we conclude that the business environment is more dynamic and interested in the attraction of European funds under ROP, while public authorities should focus more toward axis such as sustainable development and promoting tourism and improving transport infrastructure that register serious problems in the North-West region of Romania in terms of absorption rate.

Among the main objectives of the projects implemented by ROP are included: creating jobs; increasing turnover; increasing the number of customers; developing new products; increase the number of tourists through valuing local and regional cultural tourism potential on the national and international tourist market - increasing the number of visitors to the objectives restored; health facilities rehabilitated; schools rehabilitated; social centers rehabilitated and expanded; streets, alleys and parking rehabilitated etc. The definition of the Romanian Ministry of Regional Development and Tourism (RMRDT 2012) given to regional development considers it a new concept that aims at stimulating and diversifying economic activities, encouraging private sector investment, helping to reduce unemployment and not ultimately lead to the improvement of living standards. We notice that each of the projects funded by ROP 2007-2013 contribute through their objectives to increasing North-West development region living standards and attractiveness by encouraging private sector investment, by extending the scope of the organizations receiving funding, by creating jobs and thus reduce unemployment, and improving infrastructure, also improving health and social services and transport infrastructure in the region, providing high welfare to the North West region inhabitants.

To the question: "What were, in your view, the main achievements / benefits you obtained through the implementation of the project / projects?", the most frequently answers mentioned organizational development and achieving competitive advantages through product and services

diversification and improving the quality of existing ones, providing better working conditions for employees, increasing labor efficiency, ease employees' work and shorten processing, the increasing of the turnover, the increasing of the operational capacity and of the number of employees, rehabilitation and construction of buildings for carrying activity (be it profit organizations - manufacturing, services, tourism, or for nonprofit purposes), the increasing of the capacity of the buildings of social care, etc.

According to the respondents, the most important indicators expressing the impact of projects financed under ROP implemented at regional level are: investments in the region and jobs created, the number of micro-enterprises supported, improving the supply of medical services available to the population of North-West regions by bodies of hospitals rehabilitated, the valuing and protection of the environment and natural resources.

Regarding the added value of the project / projects implemented through ROP at local / regional level, the main responses were: attracting grants for SMEs, increasing the quality of the services, increasing the performance and competitiveness of companies, the development of manufacturing transport, social and tourist infrastructure.

Asked about the biggest problems encountered in the implementation of the ROP project/projects, the respondents mentioned the excessive bureaucracy, the amending of the legislation during project implementation, struggles regarding the co-financing and the big delay in reimbursement. Even so, almost all the beneficiaries declared that through the project implemented the competitiveness of their organization increased, especially through acquisition of foreign knowledge, machines, equipment and software.

To the question "In what way has increased the competitiveness of your organization?" - the answers were different according to the characteristics of each organization. We mention the following: "because of higher technical and professional capacity the company meets better the customer needs who call for the developing in a short time of large and complex investment projects in the county and beyond"; "We were able to make a bigger number of grant projects for private clients in urban and rural areas"; "It increased the number of patients due to equipment purchased and improve patient responsiveness to new and modern treatments"; "the increasement of firm productivity"; "the equipment endowment ensures greater efficiency and because of this the services of our firm are more often requested"; "it increased the number of contracts, we have diversified the activity"; "lessons learned from implementation resulted in a

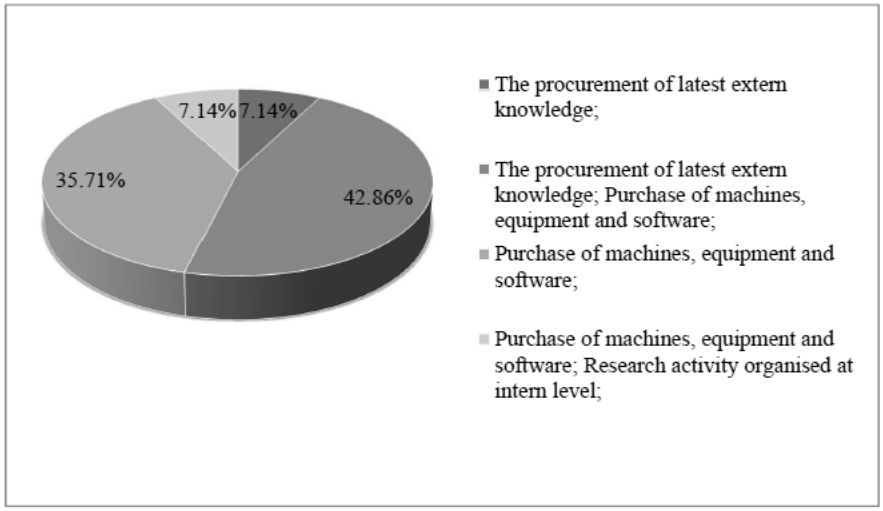
more effective management of available resources, leading to a new vision regarding the efficiency and effectiveness of our organization"; "along with the purchase of a next-generation equipment has expanded the range of products offered on the market, which resulted in an improved customer portfolio, and increasing turnover. In addition it has increased the access to new orders due to prices charged and quality of new products. Also through the modern technology the company manages to protect better the environment and to streamline costs"; "our organization's standards were raised in particular by streamlining medical services of the elderly center"; "through promptitude, shortening response controls, high quality of services offered"; " we can achieve earthworks and excavation projects at competitive prices due to the new equipment purchased ", etc.

Starting from the premise that the more innovative a region is and discovers new products, new services, new market entry and promotion strategies, the more competitive that region is and provides a level of higher social and economic welfare for its citizens, we wanted to identify the extent and manner in which the projects financed under ROP 2007-2013 in the North-West region of Romania contribute to strengthening and increasing innovation activity of the beneficiary organizations. So the next questions concern the evolution of innovation in the beneficiary organizations.

To the question whether the level of innovation of the organization's activity has increased following the implementation of the project financed through ROP, 80% of the respondents said that the level of innovation has increased as a result of project implementation, while 20% consider that the innovation level of the organization did not increase due to funding through ROP.

The increasing of the degree of innovation of the organization as a result of implementation of the project / projects with European funding through ROP among responding organizations, is due to external knowledge acquisition and procurement of latest equipment and software, amounting 42.86%. The second type of investment in innovation among respondents was the purchase of machines, equipment and software at a rate of 35.71%, while the third position in ranking is divided between two types of action with an equal percentage of 7.14% each, namely: acquisition of external knowledge and acquiring latest equipment and software accompanied by research organized internally (Figure 4).

Figure 4 Type of investment in innovation

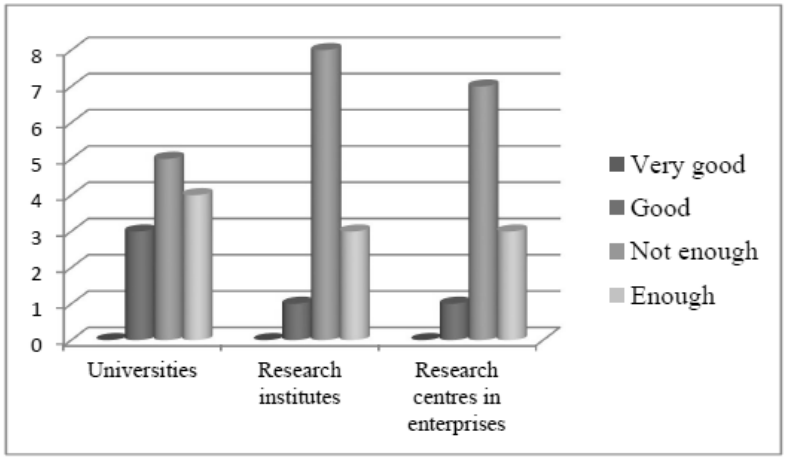


Source: author's own construction

Regarding the overall situation of investment in innovation, we notice that the overwhelming majority (80%) of the projects financed under ROP contributed to increasing the competitiveness of the organization by strengthening the most important pillar, innovation. The most common means of increasing innovation was the purchase of machinery, equipment and software found in 92.86% of cases. This type of innovation has been accompanied in some cases by latest external knowledge acquisition (in 42.86% of cases) or research organized internally (in 7.14% of cases).

We note that in the case of North-West region of Romania, through the projects financed under ROP, the general trend of beneficiaries is to invest in innovation systems (machinery, equipment and software), a weakness identified Romania in the report issued by the European Commission on the state of innovation in the Member States (EC 2011). Even if it is good to adopt and import technology and knowledge discovered and implemented by developed countries in the European Union Romanian companies and institutions should begin their own research to individualize and have a particular area of specialization at regional level. Only 7.24% of respondents conducted a research internally in the purpose of obtaining individualized products / services.

Figure 5 The involvement of the research, development and innovation sector in the specific economic activities of the organization

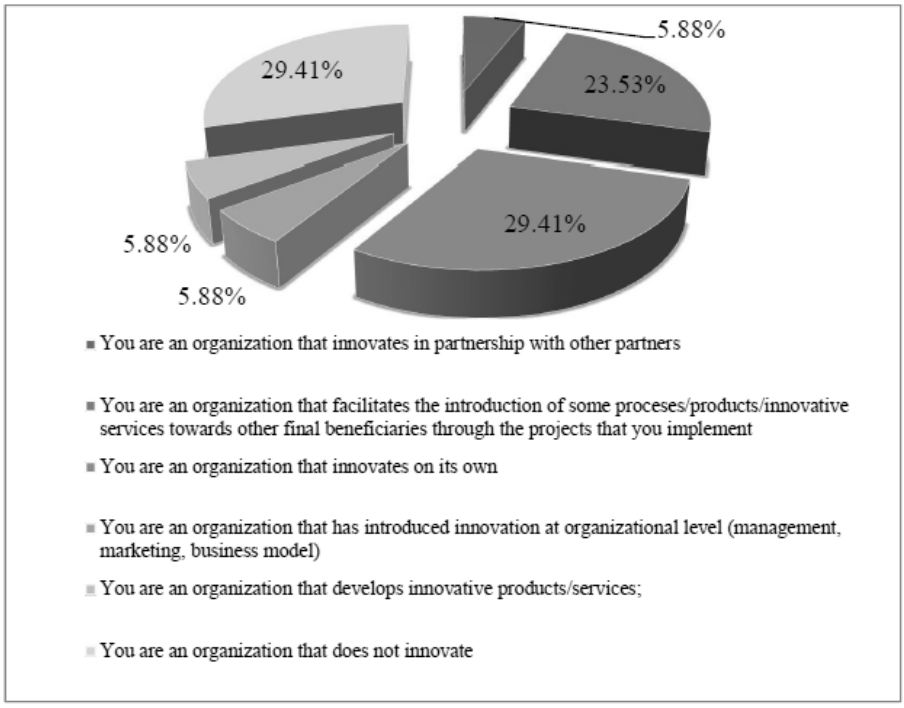


Source: author's own construction

Asked how they appreciates the involvement of the research, development and innovation sector in the economic activities developed in the field of activity of the organization they represent, the ROP funding recipients respondents find in the most part the involving of universities, research institutes and research centers insufficient (not enough), which sets a warning regarding the activity of the sector and its collaboration with the private sectors and even with the public administrative sector (municipalities, county councils and other agencies) (Figure 5). It is therefore confirmed for North-West region the insufficient involvement of the research, development and innovation sector and the need to create research centers that work in addition to industrial parks set up in the North West region, businesses ranging from the textiles industry to the software and electronics field, so as the collaboration between researchers and businesses environment to be a tight one. Of course, for these research centers and industrial parks to operate efficiently the purpose for which they were created, there must be a good communication channel between companies and researchers and professional relationships based on trust and confidentiality, and strong support and strategic vision from regional and local government. This means a collaboration known as *triple helix*, where the mission is defined, usually by government, and under this mission, the research, development and innovation sector collaborate with the industry sector of any field in order to create new knowledge, products, services and so on that are transmitted to intended final users in fulfillment of a social need.

The next question concerns the level of investment in research and development of the organization funded by ROP for the years 2010, 2011 and 2012. Only 17.65% of respondents said that they invested in research and development, while 82.35% of respondents do not invest in research and development. However, the trend of investment in research and development in the period analyzed within the organizations that declared they invest in research and development is to increase (Figure 6).

Figure 6 The state of innovation within the organization



Source: author's own construction

In terms of industrial property, the same percentage of only 17.65% who said they invest in research and development stated this time too that they have patents, trademarks, registered designs or models. So, another point that needs to be strengthened to increase regional competitiveness is to encourage research within companies for the growth of their industrial property and regional industrial property as well.

4. Emerging challenges

In order to increase its regional competitiveness Romania needs to evaluate the opportunities that European non-refundable funds offer. All the Operational Programmes established for Romania are meant to reduce disparities and increase regional development and competitiveness. Even so, we should pay more attention and try harder to increase the absorption rate if we want the benefic effects to be felt. Even more, in the next programming period, from 2014-2020 Romania should focus more through the Operational Programmes it will establish on the funding of innovation processes. We also consider that a administrative regionalization and the introduction of regional levels of governance would be of great help for Romanian regions as it would allow to create systems of triple helix innovation, that would include the academic environment, the industrial sector and the government. There should also be a focus on the rural areas, where the number of beneficiaries of funding through ROP 2007-2013 is very low. The regional development is directly linked to the rural and urban areas, and, in order to have developed regions we should focus on urban areas, but not lose focus on rural areas either.

Also the tourism, health and transport infrastructure, areas that at present have law absorption rates and whose main beneficiaries are public institutions, should be paid more attention and accessed as those aspect are crucial for the regional development and attractiveness.

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7. Cluster Development in Two Hungarian Regions – Success and Challenge

Máté Pecze

The Hungarian government supports and finances for the creation of business clusters since 2000. The Pole Programme outlines four consecutive phases of cluster development and provides the framework for cluster subsidies in Hungary for the years 2007-2013. Regional calls for proposals supporting the clustering processes were open in 2008 and 2011. This paper addresses how the Hungarian clusters performed on these calls as well as how many clusters were able to submit project proposals and to begin the program's development process? It is interesting to observe also the willingness of local companies to submit cluster projects: is there any difference between regions in terms of submitted/approved projects? Statistics on the submitted and approved projects in North Hungary and North Great Plain indicate that company cooperation could only submit projects for the 1st or the so-called "start-up" cluster phase. While currently examining the applicants' activity, today it seems that the majority of the clusters cannot deepen their cooperation and meet the requirements of the 2nd phase – or at least not the way it was planned in the governmental programme. The preliminary results of interviews reveal the reasons why clusters did not apply for the 2nd phase of clustering.

Keywords: cluster, initiative, failure, development stages, financing, call for proposal, willingness, Pole Programme

1. Introduction

Governmental support for clusters has existed since the beginning of 2000s when the Széchenyi Plan and later the National Development Plan were launched and provided the first financial assistance to build clusters. The National Development Plan was the first National Strategic Reference Framework and was consistent with the EU financial periods. This was followed by the second, the New Hungary Development Plan between 2007-2013 providing much larger source of financing than the previous framework: theoretically providing 26.5 bn EUR during the 7 years of the programming period. In 2010 the programme was slightly changed and renamed to New Széchenyi Plan. The operative programmes of these development plans (co-financed by the EU) provide financial source of cluster supporting measures in Hungary. These measures are non-refundable grants provided through call for proposals[1]. The Pole Programme – started in 2007 – was the first complex framework of

[1] By the time this article was edited (April 2013) no call for proposals was available for clusters, but new calls are expected to open in the new programming period from 2014.

cluster policy and strategy in Hungary, which defined a four-staged development programme for governmental cluster support. Until 2013, no mid-term or ex-post evaluations were done on the Pole Programme and there is little data indicating how the financed clusters operate and develop. Did the money serve the intended purpose? This paper examines the questions and problems appeared after the cluster call for proposals opened in 2007.

2. Cluster development in the Pole Programme

The Pole Programme included increased resources for development of clusters and cluster members than previous programmes. It introduced an accreditation process for selecting and qualifying clusters, and a special unit (Pole Programme Office) dedicated to the programme implementation was set up as well (MAG 2012).

Four phases of cluster-development were defined in the Programme: start-up clusters, developing clusters, accredited clusters and pole innovation clusters. The features of each step are shown in Figure 1.

Figure 1 The four stages of cluster development in the Pole Programme

	Start-up clusters	Developing clusters	Accredited clusters	Pole innovation clusters
Supported activities	Cluster management, joint services	Cluster management, joint services, investments	No financial support	Services, investments, joint centres
Subsidy for the approved clusters	EUR 0.06-0.2 M	EUR 0.2-0.8 M	No financial support	EUR 6-17 M
Approx. no. of approved clusters	150-200	50-100	25-50	5-15
Aim	Give opportunity to each initiatives	Support to the active cooperation	Accredited clusters get eligiblity for other special calls	Complex infrastructure development
Selection criteria	No strict criteria	Export, high value added focus	Export, complex economic criteria	

Source: author's own construction based on Pole Programme Office

There were no strict criteria to apply for the start-up cluster, it was easy to meet the requirements (max amount of subsidy: 0.2 M EUR). But clusters applying for more subsidy (max 0.8 M EUR) in the developing type had to undertake a joint investment. Fulfilling the criteria of the 3rd step and acquiring the title "accredited innovation cluster" did not mean

financial support – the point of accreditation was to "recognize those clusters that are over the start-up and developing phase and operating successfully for years, and qualifying them eligible for special subsidy programmes" (MAG 2012). The pole innovation cluster phase, the 4th step, was not implemented.

The government used the Pole Programme to support the formation of clusters with direct financial support and from that process choose the best of them with the accreditation process for a highly scaled, complex infrastructure development programme for the future. The grants on the first two levels (start-up and developing clusters) were financed from the Regional Operative Programmes, meaning that the government separated budget for each NUTS 2 level regions, from which the regions opened their own cluster call for proposals. The intermediate bodies are regional organisations but the budget and the managing authority is a national level entity – the latter decides on the approved projects as well. The start-up and the developing cluster calls were twice announced in the seven Hungarian regions: in 2008 and 2011.

As previously mentioned the accreditation process was organized on national level. If a cluster had been accredited, it acquired eligibility for special technology development call for proposals in the Economy Development Operative Programme dedicated to accredited clusters or to their members. In some special cases an accredited cluster member could get bonus points during the evaluation process, thus improving approval consideration. The title "accredited innovation cluster" expired automatically after 2 years, and the clusters had to apply for it again. The 4th stage, the "pole innovation cluster" step was elaborated, but not opened for the application process. Important to note is that in 2011 a new, a 0th stage of cluster development was announced: the company cooperation. Group of companies in this stage could get subsidy for joint investment and there were no need to justify the cluster-like operation.

The Pole Programme was started in 2008: the first call for proposals was announced and since that time the accreditation call has been continuously open. 3 years after the initial call (in 2011), as already mentioned, a second round of cluster calls was opened.Using a wide cluster definition, the start-up call was to give a chance for each cluster initiative in the region (that defines itself as cluster) to set up a management organisation, introduce services and build databases. Special rules applied: Those clusters that were approved as start-up in 2008 *were not eligible to apply as start-up in 2011 again.* If a cluster was approved as developing in 2008 it could apply for developing again in 2011, but not for lower level phase (start-up). The accreditation level (3rd) had no similar rules: it was opened for all types of clusters.

3. Questions and answers

My research focuses on the preconditions of creating clusters, and examines if these conditions exist in Hungary and if the subsidies of the Pole Programme were the appropriate tools to develop clusters.

My concerns regarding the Hungarian cluster development measures can be articulated through three hypotheses:

1) Hungary lacks important preconditions defined in international literature to develop successful clusters.
2) Therefore the start-up and developing cluster calls were not efficient, in most cases did not result in well-functioning, successful clusters.
3) The newly set up clusters could not proceed to the next development stages defined in the Pole Programme.

Interviews and questionnaires will be organized with policy makers and practitioners on national and regional level to verify the first hypothesis.

In order to verify the second hypothesis I have examined the result of cluster call for proposals in two regions: North Hungary (hereinafter NH) and North Great Plain (NGP), and presented as a short statistical analysis. The ongoing interviews and a regional questionnaire will provide answer to the question on which clusters are successful and functioning well from the above.

The results of the third hypothesis are the willingness of submitting proposals in the two regions – shown in Table 1 – and the cluster life paths summarized in Table 3. These figures show that only a few clusters could proceed to the next development stage defined by the Pole Programme.

4. Statistical analysis on the willingness of cluster creation in the two regions

After analysing the *submitted* projects for the two cluster calls for proposals in NH and NGP, we can select areas more willing and ready to cooperate than others. These concentrations may have the critical mass of companies, one factor often mentioned in the literature as one of the most important criteria for clustering processes (e.g. in Andersson

2004, OECD 2005, Ecotec 2003). The most important results indicated by the spatial distribution[2] are the following:

The spatial relation was studied based on two aspects: (1) place of implementation of the cluster project; (2) company seat of the cluster member organisations. (1) The weight of the two region centres Miskolc and Debrecen city: Statistics show that in 2008 53% (19 pcs) of submitted cluster projects in NH were from Miskolc and 38% (12 pcs) were submitted in 2011. The NGP region, Debrecen, has less weight: in 2008 40% (8 pcs) and in 2011 29% (4 pcs) of submitted projects had Debrecen as the origin of implementation (Table 1):

Table 1 Number of cluster member organisations and their geographic concentration according to the submitted cluster project (pcs, %)

North Hungary (NH)	**2008**		**2011**		North Great Plain (NGP)	**2008**		**2011**	
total number of cluster members	506	100.0%	504	100.0%	total number of cluster members	392	100.0%	279	100.0%
from what NH	415	82.0%	329	65.3%	from what NGP	350	89.3%	232	83.2%
other region	91	18.0%	175	34.7%	other region	42	10.7%	47	16.8%
Miskolc[3]	164	32.4%	100	19.8%	Debrecen[4]	113	28.8%	71	25.5%
Eger[3]	29	5.7%	51	10.1%	Szolnok[4]	19	4.8%	16	5.7%
Salgótarján[3]	11	2.2%	12	2.4%	Nyíregyháza[4]	55	14.0%	35	12.5%

Source: author's own construction. Data gathered by the kind permission of the North Hungarian Regional Development Agency and the North Great Plain Regional Development Agency.

The following conclusions can be drawn:

- In NH many more clusters but with a smaller size (less cluster members) had submitted projects than in NGP: 36 and 32 submitted cluster project in NH, with 15 number of members in average in both years. NGP had 20 and 14 projects, with the average size of 19-20 member organisations.
- Cluster members stayed inside the region: In NH the proportion of extra-regional cluster members were only 18% in 2008, but increased to 35% in 2011. In NGP this ratio was 11% and 17%. The increase means that the clusters of the second call have a larger regional distribution of member organisations in both regions.

[2] Limits of the methodology: cluster members were allowed to participate in more than one cluster, but I did not differentiate between them. For example: If a company had membership in 3 clusters (not common) it was counted three. Because of this methodology the figures reflect the number of *memberships* rather than the number of real business or public entities. Nevertheless, there were very few organizations (especially research centres or universities) that had member status in more than one cluster.

[3] Cities in North Hungary region

[4] Cities in North Great Plain region

- No foreign members: the four call (2 years, 2 regions) resulted 1681 cluster members altogether in the submitted projects, but there was only one entity from abroad: an organisation from Hurbanovo (Slovakia) in 2008.
- Cluster members were less concentrated in the region centres in 2011 than in 2008: In 2008 Miskolc had 32.4% and 19.8% in 2011, while Debrecen had 28.8% and 3 years later 25.5% of cluster members of their own region.

5. Examining the established clusters

The start-up, developing and accredited stages were defined as consecutive steps of cluster development in the Pole Programme: the developing calls targeted to support the best start-up clusters, the accreditation were to select the best performing developing clusters. However, in practice this did not work.

1) Only a few cluster have submitted project ideas for the developing level (Table 2). In NH 13 start-up clusters were approved and received subsidy in 2008, but only 3 of them have applied for the developing stage in 2011. Moreover one of them was rejected. These numbers are more considerable in NGP: none of the 10 start-up clusters were able to submit project in 2011.
2) Thus, the second round of cluster calls (2011) did not support the already established clusters in 2008. Instead, financial resources were once again invested in the brand-new cluster initiatives. In NH there were 20 financially supported cluster initiatives and only 3 of them have submitted project and 2 were approved (10%) in 2011. In the second call 29 new cluster initiatives applied for subsidy, 21 of these applicants were approved. NGP had 14 approved projects in 2008, no one applied again in 2011, but 11 new cluster initiatives were approved out of the 14 submitted. It is important to note that the amount of subsidy for which the submitted projects applied was only the half of the available regional cluster budget.
3) Four clusters had managed to be accredited in NGP. Only one of them was previously start-up cluster in 2008, other two clusters have never applied for the start-up nor for the developing stage. It happened that a cluster could fulfil the accreditation criteria even though its start-up project proposal was rejected.

Table 2 The number of submitted and approved cluster projects in North Hungary and in North Great Plain

region	cluster development stage	2008 approved (submitted)	2011 approved (submitted)	No. of accredited clusters*
North Hungary	company cooperation:	-	2 (2)	2
	start-up:	13 (32)	17(25)	
	developing:	4 (4)	4 (5) from which former start-up: 2 (3)	
	other clusters that have never applied	0**		
North Great Plain	vállalati együttm.:	-	0 (0)	4***
	start-up:	10 (16)	9 (12)	
	developing:	4 (4)	2 (2) from which former start-up: 0	
	other clusters that have never applied	3**		

Source: author's own construction. Data gathered by the kind permission of the North Hungarian Regional Development Agency and the North Great Plain Regional Development Agency.

Note: *clusters that have at least one successful accreditation, **preliminary assessment, ***two of them never applied for the start-up or developing stage, the third has applied for start-up but was not approved.

I am organizing 10-15 personal interviews with national and regional policy makers, researchers and practitioners. The first three interviews have already taken place and confirm my hypothesis: in several cases the results of the above mentioned non-refundable financial subsidies are not bottom-up cluster initiatives but as groups of organisations where the composition of the group has been tailored exactly to the requirements of the call while missing real cooperation and connection between its members. As an example, this is supported by the results of the interview with Mr Péter Keller[5], who underlined: the reason why we cannot find more clusters with developing phase project is that only 10-15% of the approved clusters in 2008 wanted to develop a cluster, others used the cluster only as a tool to get the financial subsidy.

[5] Manager of the Cluster Development Office, MAG Zrt.

Table 3 Cluster life paths in North Hungary region in terms of the Pole Programme cluster development phases

		2008	2009	2010	2011	2012	2013
clusters in North Hungary	Bioenergetikai Innovációs Klaszter						
	Dél-Borsodi Egészségügyi-Szociális Klaszter						
	Egerfood Élelmiszerbiztonsági és Technológiafejlesztési Klaszter						
	ENIN Környezetipari Klaszter		**A**	**A**	**A**	**A**	
	Északi Várak Útján Idegenforgalmi Klaszter						
	Észak-magyarországi Energiabiztonsági Klaszter						
	Észak-magyarországi Informatikai Klaszter			**A**	**A**	**A**	**A**
	Észak-magyarországi KKV Innovációs Szolgáltató Klaszter						
	Észak-magyarországi Logisztikai szolgáltató Klaszter						
	Észak-magyarországi Műanyagipari Klaszter						
	Geotermikus Klaszter						
	Gépgyártói, Beszállítói és Technológiai Fejlesztési Klaszter						
	HUNSPACE Magyar Űripari Klaszter						
	Magyar Anyagtudományi és Nanotechnológiai Klaszter						
	NOHAC Észak-magyarországi Autóipari Klaszter						
	Ökoland Környezetipari és Hulladékgazdálkodási Klaszter						
	Zöld Utak Turisztikai és Vendéglátási Klaszter						
	Hevesi napelemes erőmű telepítés						
	Amaránt Innovációs Klaszter						
	COREPLAST Műanyag Újrafeldolgozó Klaszter						
	Egri Borászati Klaszter						
	ENALTER Észak-Magyarországi Alternatív Energetikai Klaszter						
	Energetikai-, Gép- és Acélszerkezetgyártó- és Mechatronikai Beszállító K.						
	Északkelet-magyarországi Klaszter a húsipar biztonságáért						
	ÉMAFA Észak-Magyarországi Faipari Klaszter						
	Észak-magyarországi megújuló energiaparkok klaszter						
	Észak-magyarországi Turisztikai Innovációs Klaszter						
	Gömör-Tornai Hagyományos Termék- és Szolgáltatásfejlesztési K.						
	Hangya 2010 Észak-magyarországi gazdaságfejlesztő Klaszter						
	Infostrada Klaszter						
	Miskolc Belvárosi Gazdaságfejlesztő Klaszter						
	NAUTILUS Klaszter						
	Optimalizált Iroda Klaszter						
	Országos Megújuló Energia Klaszter						
	Tudomány és Innováció a fenntartható jövőért klaszter						
	Zempléni Helyi Termék és Szolgáltatás Klaszter						

company cooperation:	
start-up	
developing	
accredited	**A**

Source: author's own construction

Table 4 Cluster life paths in North Great Plain region in terms of the Pole Programme cluster development phases

		2008	2009	2010	2011	2012	2013
clusters in North Great Plain	Első Magyar Számviteli és Adószakértői Klaszter						
	Észak-alföldi Informatikai Klaszter						
	Észak-Alföldi Regionális Élelmiszer-Innovációs Klaszter						
	Észak-Alföldi Regionális Élelmiszerlánc-Innovációs Klaszter						
	Észak-alföldi Termál Klaszter						
	Innostrada Észak-alföldi Regionális Innovációs Kompetencia K.						
	Innovatív Turizmus Klaszter						
	Kabai Zöldipari Klaszter						
	Létesítményenergetikai Klaszter						
	Plan-Net.hu Építőipari Mérnöki Hálózati Klaszter						
	PRIZMATECH Debreceni Műszergyártó és Fejlesztő Klaszter						
	Róna Juh Klaszter						
	Szilícium Mező Regionális Informatikai Klaszter			**A**	**A**	**A**	**A**
	Záhony Térségi Logisztikai Klaszter						
	Alföldi Elektronikai klaszter						
	Első Magyar Digitális Tartalomszolgáltató és Online Marketing Innovációs K.						
	László Károly Gépipari Klaszter						
	MSE Magyar Sport- és Életmódfejlesztő Klaszter						
	Szabolcsi Alma Klaszter						
	Szatmár-Beregi Helyi Termék Klaszter						
	TEneHI - Termálenergia Hasznosító és Innovációs Klaszter						
	Zöld Áramlat Megújuló Energetikai és Innovációs Klaszter						
	Zöld Technológia Klaszter						
	Pharmapolis Innovatív Élelmiszeripari Klaszter			**A**	**A**	**A**	**A**
	Termál Egészségipari Klaszter		**A**	**A**	**A**		
	PHARMAPOLISZ Debrecen Innovatív Gyógyszeripari Klaszter		**A**	**A**	**A**	**A**	**A**

company cooperation:	
start-up	
developing	
accredited	**A**

Source: author's own construction

The three interviews indicated that the original and appropriate aim of the Pole Programme was to give a chance to as many organisations as it is possible to initiate and to develop a cluster, but the intervention and the requirements of the calls resulted in non-sustainable clusters. The logic the programme used to award subsidies and to operate would have been more helpful if well established cluster initiatives had already been operating in Hungary with years of cooperation between the members.

According to Mr Attila Nyiry[6] the whole cluster subvention framework was designed to foster only a certain type of cluster, and this was not favourable because other types of clusters (without significant export capability, SME members or research orientation) were excluded from the programme while the new cluster initiatives were indirectly forced to set up their team in conformity with the requirements. Szanyi (2008) predicted similar problems. Moreover, the four stages of the cluster development conception were not readily adaptable to the cluster life cycles in Hungary, as there was no practice for cluster-like cooperation, nor need for subsidies to finance joint investments in start-up clusters.

Another important question during the interviews and the work on the statistics of cluster projects was the following: Why were there so few clusters applying for development stage call in 2011? Why were the start-up clusters of the 2008 call not able to submit a project proposal for the development stage call in 2011? The cluster life paths and development are shown in Table 3 and Table 4.

Two interviewees gave me the same answer that I predicted:

- If a cluster submitted a project to the development call, the mandatory joint investment would put too many administrative burdens onto the companies concerned, and the term *joint investment* and *cluster* is not well defined and elaborated in the Hungarian legal regulation.
- The cluster members (companies and others) could not find a good solution as to handle the preceding problem because of the low level of trust between each other.

Table 4. denotes that there were only 4 clusters in the two examined regions that had approved projects in both of the calls. It is the development path of the North Hungarian IT Cluster and the HUNSPACE Hungarian Space Cluster (both highlighted in bold and italic) which reflect the best the Pole Programme conception: these initiatives started as start-up cluster in 2008, continued as developing cluster in 2011, and the IT cluster was accredited in 2010.

6. Conclusion

Based on the statistics on submitted and approved cluster applications in the two regions I found that the Pole Programme financed several new cluster initiatives. In terms of the

[6] Executive officer of NORRIA North Hungarian Regional Innovation Agency Nonprofit Ltd.

spatial distribution, the most of the applicants came from the relevant regions; there was only a small fraction of was extra-regional organisations (NH: 18%, NGP: 11%). In 2011 this concentration was weakened. The share of regional centre cities is high, but this decreased in both regions on the call opened in 2011. The applicant clusters (except one) had no members from foreign countries.

Generally 87% (27 out of the 31) of the newly formed clusters approved in 2008 from North Hungary and North Great Plain did not proceed on the predefined development path of the programme. According to the 3 interviews, the main reason was the a) mandatory joint investment required on the second stage of cluster development (there were no local need for such a support), b) the strong requirements for applicants to have innovation and research profile and c) the missing strong links and trust between the cluster members.

My future study is to continue the interviews to support or refute the statements above, to collect direct information from companies, and to investigate what happened to the remaining clusters that applied only in 2008 or 2011. By completing the previously mentioned interviews and a questionnaire with cluster managers I am seeking to answer whether circumstances are suitable for cluster-based economy development in Hungary, which clusters are functioning well and prospering despite the problems outlined in this study, and what kind of intervention do the Hungarian cluster initiatives need to be successful.

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8. Analysis about Hungary's Attractiveness to Investors with Particular Regard to Foreign Direct Investments

Adrienn Tarró - András Krámli

From the beginning of the 1990s Foreign Direct Investments (FDI) inflows have always played an important role in the Hungarian economy. The situation did not change even though the inflows and the stock of FDI have been decreased for the last few years. Hungary as a small open economy depends heavily on foreign capital and foreign direct investments.

However foreign capital and foreign direct investments inflows enter the countries under prosperous market, political, economic, social and legal conditions. These factors have a growing significance during the economic and financial crisis. Responding to the challenges of the economic recession more and more countries are seeking to improve their ability to attract capital because the foreign direct investments are defined as a key factor of economic growth. The question is which factors are improving Hungary's ability to attract capital?

In the first part of the study[1] *decisive factors will be revealed contributing to a country's competitiveness and ability to attract capital. In the second part these factors will be analyzed related to the Hungarian economy. In the study we describe some problems of emerging economies such as the existence of the dual economic structure, the phenomenon of stagflation, the high tax burdens and low wages all with regard to Hungary. Furthermore it will be analyzed how the low-wage jobs are promoting Hungary's attractiveness to investors. In the conclusion our proposals will be formulated in order to retain as well as improve Hungary's attractiveness to investors.*

Keywords: FDI, Hungary, competitiveness, economic growth

1. Introduction

In the years of the crisis countries must endeavour to increase their competitiveness in order to attract capital. The main question in our study is which countries are attracting an influx of capital and foreign direct investment? What must a country do in order to attract capital? In this study we try to answer these questions in relation to Hungary. We analyse Hungary's and ability to attract capital through foreign direct investment, and examine the principle factors involved comparing with Central and East-European countries.

Foreign Direct Investment (FDI) is a very important factor in the Hungarian economy. Some authors (Szanyi 2004, Artner 2003, Antalóczy – Sass 2002) have demonstrated that FDI grew the profitability and productivity of the Hungarian economy and was crucial to the

[1] This research was supported by the European Union and co-financed by the European Social Fund in frame of the project "TALENTUM - Development of the complex condition framework for nursing talented students at the University of West Hungary" project ID: TÁMOP - 4. 2. 2. B - 10/1 - 2010 - 0018.

recovery of the economy. The biggest problem facing the Hungarian economy is that Hungarian corporations could not connect successfully with multinational corporations.

In most cases we can say that Hungary is well placed in the field of competitiveness because it already has a high level of successful investment and the investors are mostly satisfied. At the beginning of 1990s Hungary used many methods to attract FDI, for example subventions, reduced taxes, low labour costs, and legal stability. However Antalóczy (2003) wrote that stability of economy is the most significant factor in attracting FDI in any country. Her study is based on a number of interviews and the interviewees said that nothing is as important as stability of economic policy. Those interviewed said that it is attractive when the concurrent foreign investor is in the host country too and their experiences of investment are positive. But how can Hungary still profit from FDI and how could it attract more foreign capital? This study tries to answer these questions, but it is very difficult to do so because the concept of competitiveness is used to explain a variety of factors.

The key question is what is the fundamental motivation for a firm to go abroad? Until now, there was a general consensus among the experts on the question of why multinational companies invest in specific locations. The view was that MNCs are mainly attracted by strong economic incentives in the host economies. The most relevant of these are size of market and the level of real income, with qualification levels in the host economy, the quality of infrastructure and other resources that support to specialize efficiently the production, trade policies and political and macroeconomic stability as other central indicators (Blomström − Kokko 2003). More than 100 countries provided various FDI incentives in the mid-1990s, and dozens more have implemented such incentives since then – today few countries compete for foreign investment without providing any form of subventions (UNCTAD 1996).

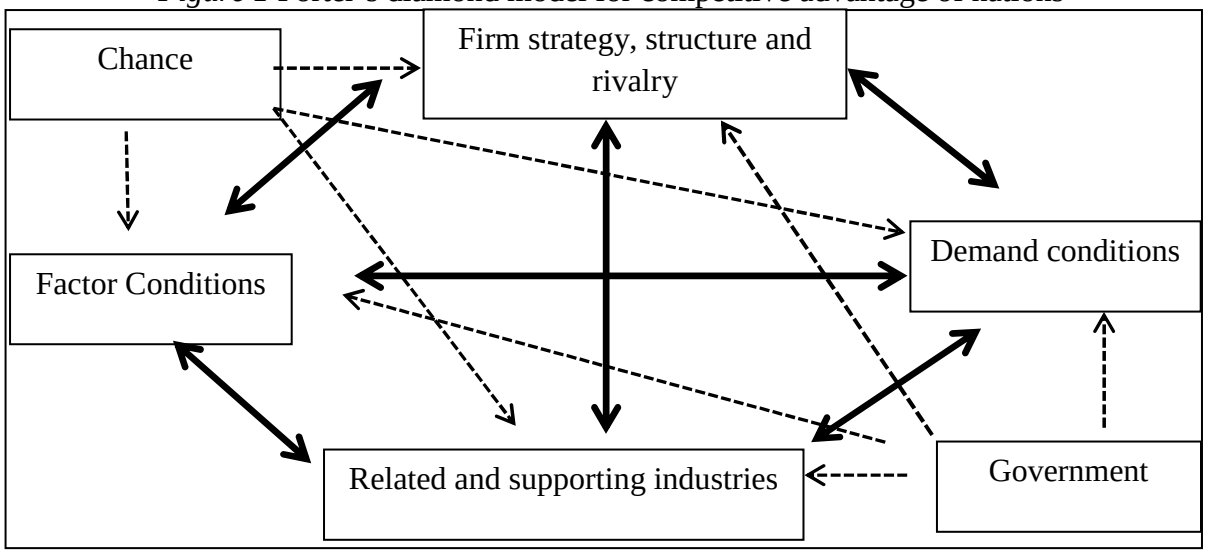
2. Explanatory theories of Foreign Direct Investments

The theories explaining FDI flows were looking for an explanation of what factors influence their production in foreign countries. Working capital theory had a major impact on the development of explanatory theories of international trade. In the following article we show how the main theories explain the flow of foreign direct investment. The earlier theories (for example the Froot-Stein model) suggest that when the impact of the change in the cyclical FDI is expected to be favourable companies bring forward their investment, while investment is delayed by an unfavourable environment (Nielsen et al. 2010).

2.1. Porter – diamond model for countries

National competitiveness has become one of the central preoccupations of government. Yet for all the discussion, debate, and writing on the topic, there is still no persuasive theory to explain national competitiveness (Porter 1990). Porter (1990, p. 87.) believes that "*the only meaningful concept of competitiveness at the national level is productivity (…) and the ability (to be competitive) depends on the productivity with which a nation's labour and capital are employed*".

Figure 1 Porter's diamond model for competitive advantage of nations



Source: Porter (1990)

In our study we demonstrate that it is not necessarily true, for example: Hungary has among the Visegrad countries the biggest FDI stock but we have not so high productivity than the other countries. Porter's diamond model, illustrating competitive advantage among nations includes four determinants which influence the competitiveness of states. We think so that the competitive advantage of nations is more complex and includes several factors.

2.2. OLI paradigm

"*None of the general theories of FDI have been able to satisfactorily explain the international activities of firms. A candidate for a general theory of FDI is Dunning's Eclectic Theory, which is based on the OLI paradigm*" (Moon − Roehl 1993, p. 56.).

The eclectic theory is a mixed theory and is based on transaction cost theory. The three components of the OLI paradigm are ownership specific advantage, location specific advantage and internalization specific advantage. Location specific advantage depends upon the existence of raw materials, wage levels, and the existence of special taxes or tariffs (Dunning − Lundan 2008)

Three forms of international activity on the part of companies can be distinguished: export, FDI and licensing. According to Dunning, two different types of FDI can be noted. First, that which occurs in order to establish access to raw materials. Second, market seeking investments, which are made to enter an existing market or establish a new market. If the ownership specific advantage is weak and the location specific advantage is strong then more foreign direct investment flows into the host economy (Dunning 2000). In the second part of our study we show that Hungary has rather location specific advantage (for example: low wages, well trained labour supply, middle-high productivity, low prices, opened economy therefore high-level international economy).

"*The eclectic paradigm of Dunning has more explanatory power than others because it uses more variables, not just ownership advantages*" (Moon – Roehl 1993, p. 59.).

We are not attempting to describe the often cited Vernon's product life cycle theory and Ozawa's phase model in detail. We only refer to the fact that Vernon's product life cycle theory explains the flow of capital from developed countries to developing countries, and that Ozawa's phase model explains investment factors between the developed and developing states.

2.3. Advanced Factors of Location

Buhmann and his co-authors (2002) wrote in their publication about more advanced factors of location. These factors influence the decisions of company owners and have the following fields: performance, market factors, and production factors. Every field has three groups: monetary, non monetary and quantitative elements. The performance consists of productivity, costs, soft facts of performance, process goods and sighed revenues. The market factors are potential profit, attractiveness of market, situation of rival companies, constraints of trade, market structure and strategy of competition. The production factors are costs, incentives, infrastructure, availability of production factors, and quality of infrastructure factors, social culture, political factors, and legal factors. Transnational or multinational companies will only invest if the host country is strong in these factors. A country's

competitiveness has a significant impact on its foreign trade policy as in Hungary too. In recent years, more and more countries have liberalized their trade policies in order to increase their ability to attract capital. Even during the years of financial crisis abolished customs duties, quotas and free passage of foreign goods, and capital were increasingly a measure of competitiveness (Blomström − Kokko 2003).

3. Empirical evidence

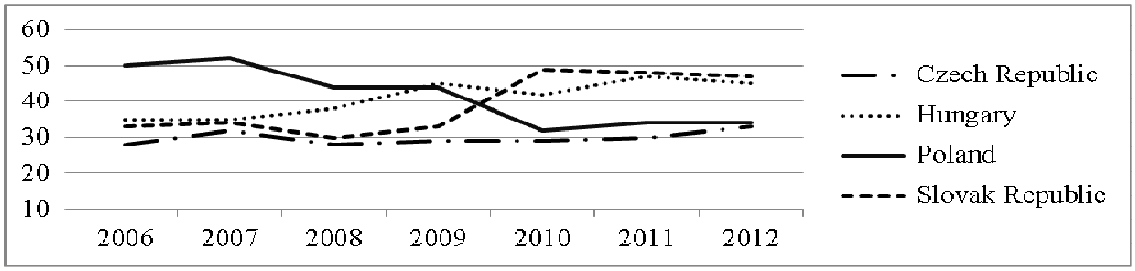
International comparisons are made with regard to countries' competitiveness using various indicators to establish a ranking. The tow most well-known comparisons are those provided by the IMD and the World Economic Forum. The country competitiveness rankings are published every year, which makes it possible to examine the relative position of a country by international standards and to see which factors have improved or worsened competitive ability over the course of the past year. This study first shows the Competitiveness Rankings from IMD and then the competitiveness rankings of the World Economic Forum.

3.1. IMD Competitiveness Rankings

Figure 2 demonstrates the competitiveness of Visegrad countries between 2006 and 2012. As we can see Hungary's competitiveness is reduced during these seven years but Poland is the exemption among the Visegrad nations since its competitiveness has increased over the period in question. The period between 2006 and 2012 saw the greatest improvement for Poland. The Slovak Republic by contrast suffered the most intense reduction over the same period. The Czech Republic has similar values across the period, between 28 and 34, and did not see such significant changes. With the onset of the global financial crisis there was a drop in values for the majority of countries.

This competitiveness ranking includes the following four factors: economic performance, government efficiency, business efficiency and infrastructure. We would like to analyse the indicator "economic performance" in greater depth because we think so that this indicator is the most important.

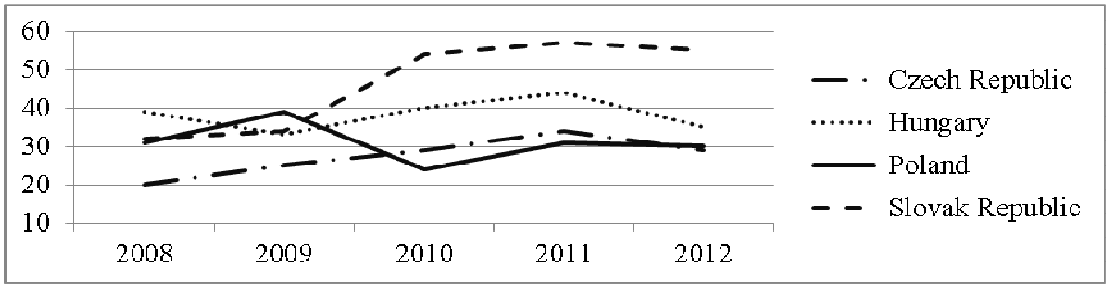
Figure 2 Overall Competitiveness Ranking in Visegrad countries (2006-2012)



Source: www.worldcompetitiveness.com

As Figure 3 shows, the Visegrad countries have very different economic performance values. Economic performance includes domestic economy, international trade, international investment, employment, and prices. In the case of "economic performance" Hungary's rank is greatly reduced as it is in overall competitiveness. The other countries have similarly weak data. In this category of performance the Slovak Republic once again has the weakest ranking, and again in this field Poland has an improved position.

Figure 3 Economic Performance Ranks in Visegrad countries (2006-2012)



Source: www.worldcompetitiveness.com

When we look at the performances in the case of Hungary we can establish that the biggest failure is in the field of infrastructure and more moderate declines occur in the field of business efficiency and government efficiency (Table 1). The infrastructure performance includes the following factors: basic infrastructure, technological infrastructure, scientific infrastructure, health and environment, and education. One of the biggest problems in Hungary is that the R&D (research and development) in relation to GDP is too low. Figure 4 partially confirms our observation (see for example the factor "Education"). The Hungarian R&D rate was 1,20 per cent in 2011. This proportion was the lowest in 1996 and it signifies 0,64 per cent of GDP (Central Bank of Hungary). It is growing slowly from year to year but the growth remains low.

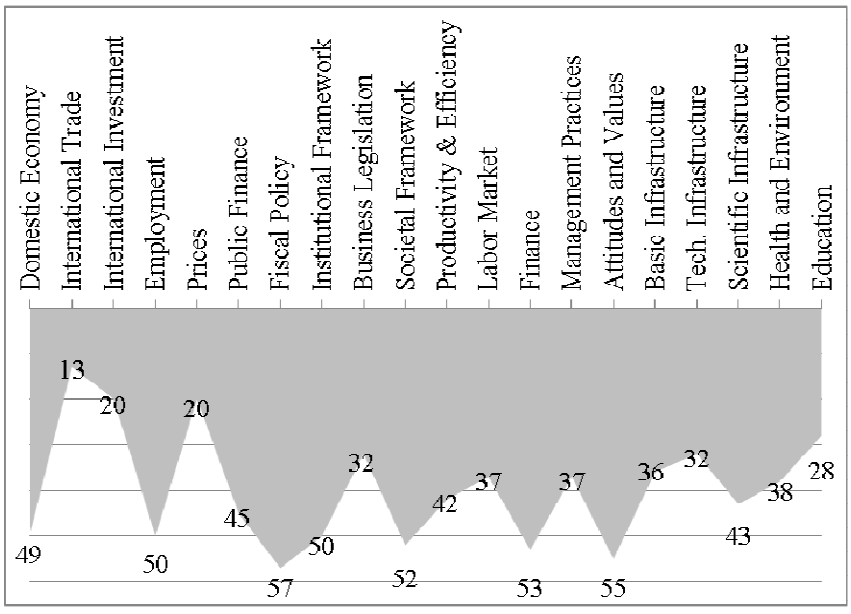
Table 1 All indicators ranking of Hungary

Indicators Ranking	**2008**	**2009**	**2010**	**2011**	**2012**
Overall Competitiveness	38	45	42	47	45
Economic Performance	39	33	40	44	35
Government Efficiency	47	50	51	52	51
Business Efficiency	45	52	47	50	49
Infrastructure	27	33	35	35	35

Source: www.worldcompetitiveness.com

Figure 4 presents the World Economic Forum data concerning Hungarian competitiveness. It shows that Hungary's strengths are in the fields of international trade, international investment, prices, business legislation, and education, and we have the weakest value in the fields of domestic economy, employment, fiscal policy, international framework, finance, attitudes and values and scientific infrastructure.

Figure 4 Competitiveness Landscape of Hungary



Source: World Economic Forum: World Competitiveness Online

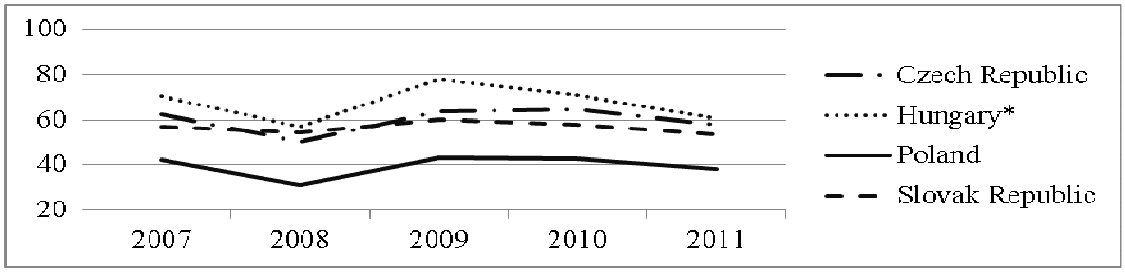
Hungary is a small country with many neighbours; therefore international trade is important and attractive in our situation. On the homepage of World Competitiveness Online we can see the data regarding the competitiveness of Hungary. And here it was established that Hungary's competiveness reduced. Hungary's ranking fell from 38 in 2008 to 45 in 2012.

Every year the World Economic Forum produces a Global Competitiveness Report. This report provides a ranking for all countries. Hungary currently has the rank of 60.

If we analyze the absolute data from the inflow of Foreign Direct Investment, we can see that in Hungary at the beginning of the 1990s there was a big increase, and there was a further increase in the post-millennium years. Before the early 1990s there was very little FDI. At the beginning of 1990s there was a high level of privatisation and as a result there was a heavy influx of foreign capital to Hungary. Our country was very successful and a popular location for investors. Later the inflow of FDI fell, and dramatically so towards the end of the 2000s. At this time Hungary's popularity as a location for FDI fell.
Poland is exemption in absolute terms due to its size, but relative to GDP the ratio is the same as the data for other countries. When we compare the four countries' data the Slovak Republic has a lower inflow and the Czech Republic has a higher FDI inflow.

Finally when we look at FDI as a percentage of GDP, Hungary has the greatest rate of the Visegrad countries. In the years of economic crisis the data shows decreases for of these states. It demonstrates that Hungary is more open to foreign investment state that the other countries and it depends very heavily on the world economy. This data is not surprising because UNCTAD publishes a yearly working paper detailing the international rate of foreign investment for all countries and in 2004 it wrote that Hungary ranks 6th in the world of the countries most open to foreign investment (UNCTAD 2004).

Figure 5 FDI stock in per cent of GDP in Visegrad countries (2007-2011)



Source: www.oecd.org
Note: *Hungary: Data excluding Special Purpose Entities

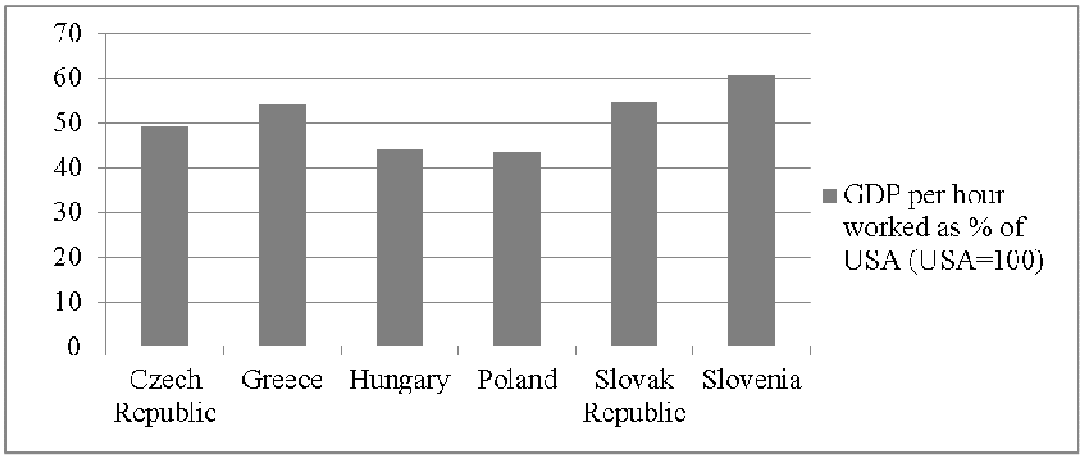
Poland the highest figures for absolute value, because it co is bigger than the other countries. In Slovakia FDI does not play such an important role as in Hungary or the Czech Republic.

Until the year 1999 a total of 19.276 million dollars FDI came into Hungary exclusive of reinvested profits. Hungary occupies a prominent position in the Central-East European

Region (Antalóczy 2003) when it comes to FDI. But what is Hungary's strategy for investment promotion? Hungary uses many methods for investment promotion. For example: tax exemption, reduced preferential taxes, subvention of government for investors. Government subvention was prevalent in the 1990s. But subvention in other European countries is lower. Hungary tries to be free of discrimination and to follow a policy of transparency.

The majority of studies about Hungarian investment promotion assess all multinational companies in the same way and do not make distinctions between the companies. The European Commission (2013) published a working paper about the Hungarian economy, growth potential and tax system on 10th April. It wrote that Hungary's recovery has been the weakest among the Visegrad countries since the 2009 recession and the marked decline of inward direct investment over recent years contributed to the stagnating total stock of net foreign direct investment. The substantial FDI investments (around 2% of GDP) into the automobile industry have already begun to improve or will improve productive capacities in the automobile sector (by some 50%) in the coming years. The rate of total investment (including domestic, foreign and government investment) has decreased to around 17% of GDP.

Figure 6 GDP per hour worked as % of USA (USA=100%, 2011)

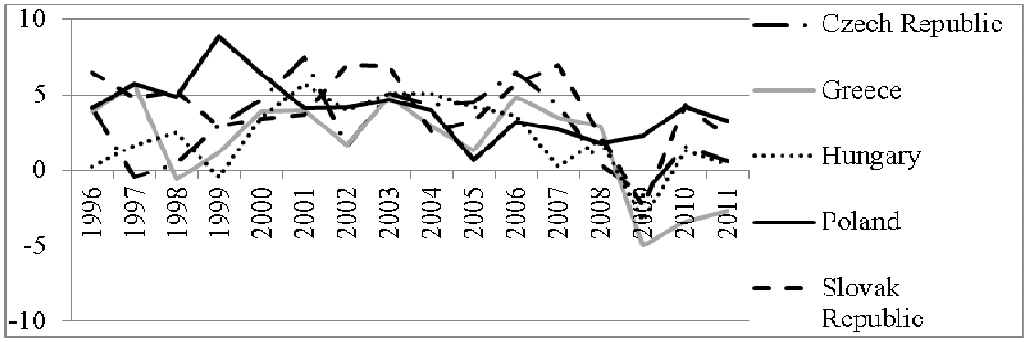


Source: www.oecd.org

Porter wrote that productivity is very important to competitiveness. Therefore we show the indices of productivity in our example: GDP per hour worked as a percentage of the figure for the USA (Figure 6). In this comparison Hungary has an unfavourable situation. Hungary

has the weakest data and Slovenia has the strongest. Figure 7 is also connected to productivity.

Figure 7 Labour productivity growth in the total economy



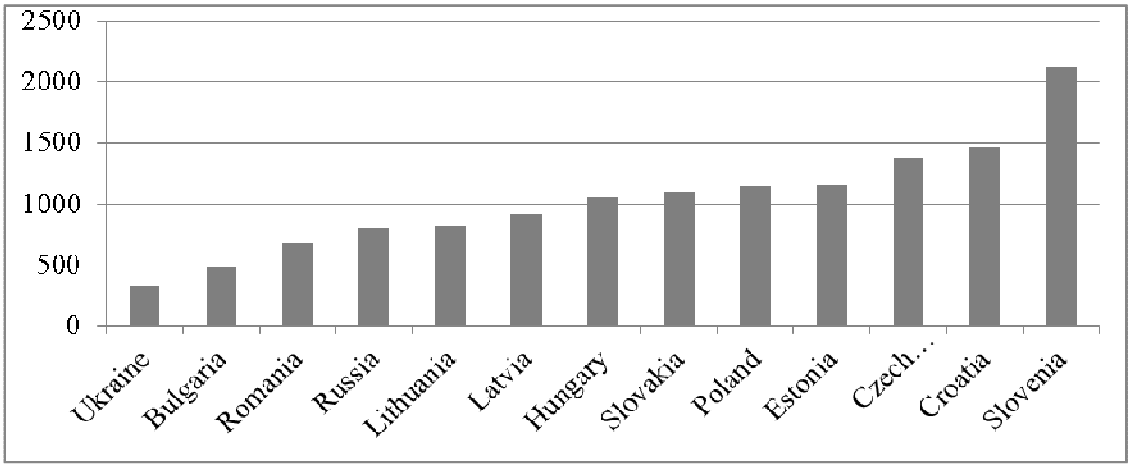
Source: www.oecd.org

Figure 7 shows the labour productivity growth in these five countries. In the early 2000s and from 2008 to 2009 Hungary could increase its efficiency. In 2009 because of of crisis the productivity of all countries, with the exception of Poland, decreased. It is very intresting that the productivity of Poland did not decrease. The bigger falling had the Slovak Republic and Greece. In the next years all the countries increased their rates of productivity. Hungary reached about 1,5% but in 2011 productivity was lower again. In comparison to other countries Hungary has average values but it is able to execute and produce to higher levels. We can see this in the earlier years where the growth of productivitiy was more than 4-5%.

Szanyi (2004) underlines that Hungary should be able to benefit in the fields of wages, taxes, domestic recources, domestic market, research and development (R&D) and stability of suppliers. Szanyi believes the earlier realized positive investment influences the future decisions of investors in a positive way. Hungary must bring knowledge-related competitiveness into focus and needs to establish a good image.

It is a big problem too that middle-size companies are not operating in Hungary just small-size companies and some bigger firms. The economic structure is dual: first there is a domestic part of the economy and secondly there is another part with a closed or “enclave” character. The first part is mostly developing, and not so productive and the second is developed and more productive. These parts have not connection and the developed sector can not enhance the low-developed sector.

Figure 8 Average monthly gross earnings in US$, 2011



Source: www.databasece.com

As stated above lower wages are the one benefit of competitive advantage. When compared to other European countries *Figure 8* shows that Hungary is in the middle. The lower developed countries have lower average wages. Slovakia, Poland and Czech Republic don't have significantly higher values. In almost all countries in this region there are lower wages and this is one of their strengths from the point of view of foreign investors.

The exception is Slovenia because it depends less on foreign trade and foreign direct investment, and has a more stable domestic economy. Also in this aspect Hungary has no greater advantage than the other countries in the region.

3.2. Credit Rating

Finally we show the role of credit rating. International credit rating organisations have a major influence on a country's external image. These organizations classify countries according to their credit rating, and all data is based on the economic situation. If a country's credit rating is reduced it has knock on effects. This means transnational corporations may decide not to invest in the country of destination based on this information alone, when the impact of investment could be highly profitable. Hungary's credit rating has deteriorated in recent years. The three major credit rating companies (Moody's, Fitch, and Standard & Poor's) all downgraded Hungary. Hungary's long-term foreign currency debt is classified in the negative, and is projected to be negative. These facts, unfortunately, have a negative impact on investment decisions (Central Bank of Hungary).

4. Conclusion

In this study we tried to analyse the competitive advantages of Hungary. Although Hungary is found in a good position regarding its competitiveness, economic performance or FDI stock compared with Poland, Slovak Republic and Czech Republic, the tendencies are more threatening. The crisis influenced Hungary's advantages markedly. The high FDI stock means at the same time a high exposure for the Hungarian economy which could be one factor contributing to the uncertainty for investors. According to the figures since 2008 the negative tendencies are significantly more noticeable in Hungary than in the abovementioned countries. In the competitiveness ranking Hungary had a weaker position than previously. In this uncertain situation it is most important to improve Hungary's economic and political stability. We think that it is not in a significantly different position to other Central-Eastern European countries and we could promote our advantages better and more efficiently.

The biggest problem in Hungary is to achieve competitiveness via lower wages. Low wages are the barriers of creating workplaces with higher added value, because the well-trained workforce is rather going to West-European countries. However this is not the most important factor to investors, it results in point of fact the phenomena of brain drain and in the long run reduces the chance to increase productivity, competitiveness as well as economic performance. Hungary has good production resources but just lesser resources when it comes to trained labour. We must create a knowledge-based society, influence the rate of research and development and develop knowledge-networks. These factors could grow our advantages. At the end of our working paper we think so that the FDI stock and the competitiveness is related but not significant.

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9. Measurement Approaches of the Competitiveness of the Hungarian "City-Region" by International Attempts

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In recent decades, thanks to the strengthening of globalization the economic and social procedures have been transforming. The local economic development theories came to the front pointing to the fact that city-regions have decisive role in the increase of competitiveness. Therefore, numerous researchers aim to elaborate such analysis methods by which the competitiveness of a certain territorial unit can be measured. In this way they can facilitate and raise the competitiveness of territorial units by the elaboration of strategic steps based on their competitive advantages.

This study[1] *investigates those methodological approaches by which the competitiveness of city-regions can be determined. The competitiveness of city-regions can be measured by different indicators. In this study, we will overview six internationally recognized index systems with benchmarking method. Then we will try to adapt and evaluate them for Hungarian circumstances.*

Keywords: "city-region", urban development, competitiveness, measurement approaches

1. Introduction

In recent decades, thanks to the strengthening of globalization the economic and social procedures have been transforming. The strongest process in the transitional economy is the local level coming to the front. The local economic development theories have came to the front pointing to the fact that cities and city-regions have decisive role in the increase of competitiveness.

The OECD and European Commission have adopted the following approach to defining city regions (EC 2011): (1) a city consists of one or more municipalities, (2) at least half of the city residents live in an urban centre, (3) an urban centre has at least 50,000 inhabitants, it consists of a high-density cluster of contiguous grid cells of 1km^2 with a density of at least 1,500 inhabitants per km^2 as well as filled gaps, (4) if 15% of employed people living in one city work in another city, these cities are combined into a single destination, (5) all municipalities with at least 15% of their employed residents working in a city are identified, (6) municipalities sharing at least 50% of their border with the functional area are included.

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Using the latest definition of OECD-EC once all cities have been set, a commuting zone can be determined based on commuting patterns using the following steps (Dijsktra – Poelman 2012): (1) if 15% of employed people living in one city work in another city, these cities are handled as a single city, (2) all municipalities with at least 15% of their employed residents working in a city are referred, (3)municipalities surrounded by a single functional area are included and non-contiguous municipalities are dropped.

Seeing the similarities between the definitions we conclude that the larger urban zone consists of the city and its commuting zone.

The differences between the state of economic development of city-regions in terms of welfare and living standards are well known. The population and economic position of some cities are increasing in the context of global competition while other cities are suffering from economic decline. Therefore, one of the most important research fields in the frame of regional studies is the elaboration of such analytical methods by which the competitiveness performance of city-regions can be measured and compared. That is why in recent years several decision-makers and analysts have tried to develop such indices, which join the outstanding indicators as a comprehensive measurement. These indicators could quantify the performance of the given territory, facilitating as well as raising their closing up and competitiveness by elaboration of strategic steps based on the competitive advantages of the given territory.

This study analyses those methodological approaches through which the competitiveness of city-regions can be determined. We have overviewed six internationally recognized index systems with benchmarking method paying special attention to those indicators, which are crucial for determination of the overall competitiveness of the given city-region. Then we have tried to adapt and evaluate them for Hungarian circumstances. We are investigating those drivers such as population, productivity, employment, unemployment, qualification, connectivity and innovation. To sum up we will underpin with some remarks the usefulness and role of the measurement of competitiveness.

2. Measurement approaches of the aompetitiveness of city regions

In this chapter, those methodological approaches are examined by which the competitiveness of city regions can be determined. Using the most significant international index systems special attention is devoted to the indicators which vitally determine the whole competitiveness of the given city region. Despite the relative popularity of the term, there is,

surprisingly, a lack of consensus about what is meant by the competitiveness of regions and cities.

According to Parkinson and his co-authors (2003, p. 19.) follows Michael Storper's (1997) definition that, urban competitiveness can be determined as "*the ability of an economy to attract and maintain firms with stable or rising market shares in an activity, while maintaining stable or increasing standards of living for those who participate in it. The competitiveness of cities is not just about the income of firms but also about how that income goes to residents. And competitiveness is different from competition. Competition can be a zero-sum game, in which if one city wins another loses. By contrast cities can all increase their competitiveness at the same time, so that all cities and the national economy can simultaneously grow and benefit*".

They explore and assess ten potential characteristics of a competitive city as follows: *strategic transport and connectivity, a city centre of European distinctiveness, facilities for events, development and innovation, effective governance, cultural infrastructure, high quality residential choices, environmental responsibility, diverse society, and highly skilled workforce.*

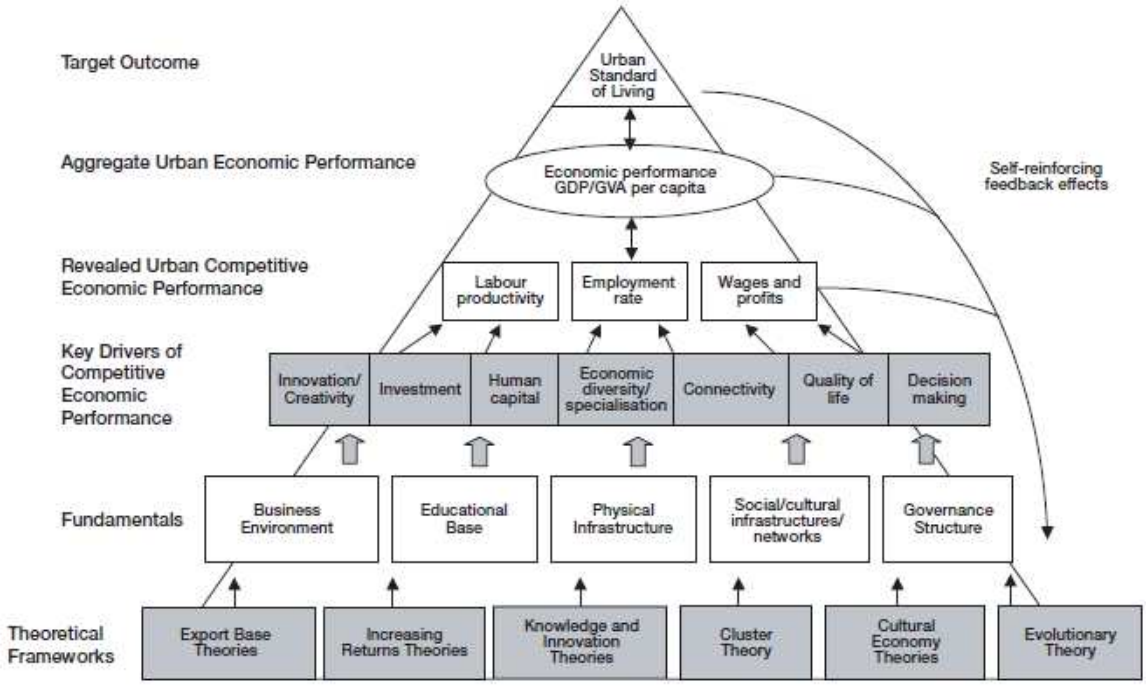
According to the bibliography a couple of methods have been elaborated for measuring the competitiveness of city-regions (Gardiner et al. 2004, Lengyel 2004, Lukovics 2008). Experts say that the best model is Lengyel's (2000, 2004) pyramid model that reclines the development of the regions using the experiences of successful regions.

In the field of regional science many known researchers have taken and have built on the logics of the model (Berumen 2008, Gardiner et al. 2004, Resch 2008, Snieska − Bruneckiené 2009).

Using the logic of the pyramid model and taking in consideration the characteristics of the cities, Parkinson (2006) has analyzed the competitiveness of the cities in the United Kingdom (Figure 1).

Porter also underlines that wealth is created at the microeconomic level and it is in the ability of firms to create goods and services using productive methods. The sound fiscal system, the good monetary policy, an efficient legal system can help greatly in creating wealth but they do not create wealth in themselves (Porter 2004).

Figure 1 Conceptualising urban competitive performance



Source: Parkinson (2006, p. 67.)

Global Urban Competitiveness Report has been launching since 2004. Those are empirical studies of the competitiveness of 500 cities around the world. It ranks cities in the given countries by their size and economic significance. The report is useful by itself but especially for the decision-makers who are leading cities over the world as it can show direction in the field of strategic economic planning and realization. The data have been collected by the assistance of UN, World Bank, IMF, OECD as well as national statistical offices. The need for having comparative data was given while indices had to be restricted to nine areas, which are related to GDP, prices, growth, patents and employment. A theoretical analysis has been made in the frame of GUCR (2010) which looks at drivers such as *population, productivity, employment, qualifications and certain other social indices.*

Urban Audit is a joint effort by the Directorate-General for Regional Policy and Eurostat to provide reliable and comparative information on selected urban areas in Member States of the European Union and the Candidate Countries. In the mid-nineties, the need for comparable information on European Agglomerations was formulated which led to the implementation of the so-called Urban Audit Pilot Phase, targeted to measure the quality of life in towns and cities through the use of a simple set of urban indicators and a common methodology, in May 1998. Urban Audit includes very wide range fields of competitiveness

indicators such as *demography, social aspects, economic aspects, civic involvement, training and education, environment, travel and transport, information society, culture* and *recreation, perception indicators*.

The OECD (2006) report studies the 78 largest metro-regions with more than 1.5 million inhabitants and more. According to OECD successful cities attract talented young well-skilled workers, are centres of innovation and entrepreneurship and are competitive locations for global and regional headquarters. The proximity of universities to research and production facilities mean that cities are where new products are developed and commercialised.

Simmie and Carpenter (2008) argue that a combination of evolutionary economic and endogenous growth theory provides a convincing explanation for the judgement of city-region competitiveness. Evolutionary economic theory identifies the adaptive and innovative capacity of urban and regional economies. Endogenous growth theory focuses in particular on the elements needed to adapt in such an economy. These include investment in human capital and the innovative milieu.

Since 2001 the Beacon Hill Institute publishes yearly its report that examines the competitiveness of 50 states of the United States and 48 metropolitan regions, with given indicators (BHI 2011). The BHI competitiveness index is ground for a set of 44 indicators divided into eight sub-indexes as the follows: "*governmental and fiscal policy, security, infrastructure, human resources, technology, business incubation, openness and environmental policy*" (BHI 2011, p. 8-9.). As a result we can see an order of rank between these states and metropolitan regions, based on the competitiveness of the indexes.

In Table 1 we compare the internationally acknowledged competitiveness index systems, which were presented formerly, and we also sign those indicators which appear in the given index systems. In this way, we can see which are the indices most frequently appeared, assuming that those can express the competitiveness of city regions supremely. Most of the indicators and indicator-groups presented in Table 3 could be used in Hungarian circumstances as well.

In the last years there have been numerous attempts for measuring and comparing the performance of the competitiveness of city-regions. "*Efforts have increasingly focused on the development of composite indices, which combine relevant indicators into one overarching measure. Such indices and rankings attract widespread attention in the media and could be regarded as a potentially useful means of helping firms, policy-makers and institutions to*

assess the performance of their economies in comparable (i.e. numerical) terms, and to undertake appropriate remedial strategies" (Berger 2011, p. 17.).

Table 1 Occurrence of competitiveness indices in different sources

Index Denomination	BHI (2011)	OECD (2006)	GUCR (2010)	Simmie – Carpenter (2008)	Parkinson (2003)	Urban audit (2004)
Governmental and Fiscal Indices						
GDP (total, per capita, per km^2)	+	+	+	+	+	+
Increase of productivity	+	+	+	+	+	+
Safety						
Number of crimes per 100.000 inhabitants	+	+	+			+
Infrastructure						
Number of air passengers per inhabitants	+		+		+	+
Transport, connections, average commuting time, tourism	+				+	+
Households, average rental of a flat/office	+		+			+
Human Resource						
Rate of population growth, gender balance	+	+	+			+
Proportion of ISCED 5-6 degree in the population above 25 years old (%)	+		+	+	+	+
Unemployment rate (%)	+	+	+	+	+	+
Number of students in higher education per 1000 inhabitants	+				+	+
Postnatal mortality per 1000 births, life expectancy	+		+			+
Technology						
Innovation, number of patents per 100.000 inhabitants	+	+	+	+	+	
Business Incubation						
Number of firm establishment per 100.000 inhabitants, bankrupts	+	+			+	+
Openness						
Per capita domestic/foreign direct investment (R&D)	+		+	+	+	
Nationalities, proportion of population born abroad (%)	+	+	+			+
Environmental Policy						
Waste management, energy use, emission of greenhouse gases (million ton carbon equivalent/1000 km^2)	+		+		+	+

Source: author's own construction

According to Gordon (2011, p. 36.) "*one factor in the eventual rise of territorial competition here seems to have been recognition that within a Single European Market where urban services became freely tradable urban competitiveness became a matter of national*

economic interest". Within Hungarian circumstances, GUC and Urban Audit systems could be used perhaps in the most appropriate way. They contain almost all indicators appearing in other examined methods as well as apply special indices to express the territorial uniqueness. The other methods are used for states or special regions which could not be easily adapted to Hungarian conditions.

3. Settlement particularities in Hungary

In this chapter we present that taking in consideration the special space structure of Hungary, which are those areas that could be defined as "city-regions", based on the internationally accepted terms. After we try to adapt to these settlement groups the competitiveness indicators, taken from the internationally recognized methods.

After the World War I. the geographical realignment caused by the Trianon Peace Treaty as well as significant changes in farming systems during the twentieth century were affecting the network of Hungarian settlements. Some settlements were developing towards while others were stagnating. Some areas have been remaining without towns. Therefore, neither core cities nor larger urban zones exist in most of the territory of Hungary unlike in Western Europe or in the United States. Budapest is approximately ten times bigger than the average size of the 23 municipal towns. Besides those, there are more than 200 middle-sized and some hundreds of small towns and settlements, altogether 3154 in Hungary. In total, 328 settlements have the legal status of a town and 2826 have that of a village. Together 1097 settlements (34.8%) have less than 5000 while 675 (21.4%) have less than 1000 inhabitants. In Hungarian circumstances, those settlements can be considered as cities whose population exceed the 50 thousand people (HCSO 2012).

Table 2 represents the distribution of Hungarian cities from the viewpoint of their population size. As it can be seen there are only ten cities in Hungary which have more than 50.000 inhabitants, this is the 29% of the total population. If we add the inhabitants of the commuting zones to the cities it results 49% in total. That is 21% less than the EU average.

The current demarcation of urban settlement-groups was realized by the Hungarian Central Statistical Office in August 2003 (Figure 2). According to that, there are 21 urban settlement- groups in the area of the country. The urban settlement groups can be ranged into three types: agglomerations, agglomerating areas and settlement groups. These denominations refer to the degree of interconnections among the settlements involved.

Table 2 The distribution of Hungarian cities in terms of their size

	S (50.000-100.000)	M (100.000-250.000)	L (250.000-500.000)	XL (500.000-1.000.000)	XXL (1.000.000-5.000.000)	Global city (5000.000-…)	All cities	Commuting zone	Larger urban zone
	Number of cities according to the size of their urban centre								
	Cities by urban centre size in population								
Hungary	5	4	0	0	1	0			
EU	410	261	71	38	24	2			
	Share of population per country per city size and commuting zone, 2006								
Hungary	5,3	6,9	0	0	16,8	0	29	20	49
EU	7,6	9,4	5,1	5,7	9,6	2,8	40	22	62

Source: author's own construction based on Dijsktra – Poelman (2012)

The cities of Hungary are incorporated in agglomerations, agglomerating areas and settlement groups. There are 4 agglomerations, 4 agglomerating areas and 13 settlement groups. Hungarian Central Statistical Office gathers different kinds of territorial indicators in reference to these urban micro-regions in each year. The most relevant and internationally recognized competitiveness indicators have been selected.

Figure 2 Agglomerations, Agglomerating regions and Settlement-groups in Hungary

Source: www.ksh.hu

Table 3 represents the data compiled from the latest regional statistical information of Hungarian Central Statistical Office. In the database, there are much more indices which, due to their high number, could not be shown totally in the frame of present study.

Table 3 Selected competitiveness indicators of Hungarian urban micro-regions in 2011

Denomination	Natural increase or decrease per thousand inhabitants	Rate of job-seekers registered over 180 days	Number of tax-payers per 1000 inhabitants, 2006	Dwellings built per ten thousand inhabitants	Higher educational institutions students	Discovered publicly indicted crimes	Registered corporations and unincorporated enterprises	Catering units per ten thousand inhabitants	tourism nights	Passenger cars
		in population of working age, %			per thousand inhabitants	number	per thousand inhabitants		thousand	per thousand inhabitants
AGGLOMERATIONS										
Budapest Centre	-3,4	2,1	433	18	80	6 194	220	62	191 122	326
Budapest agglomeration, total	-2,3	2,1	436	23	60	5 336	198	56	239 896	337
Győr agglomeration, total	-2,0	1,7	492	11	71	5 333	160	56	12 565	315
Miskolc agglomeration, total	-4,5	5,7	425	5	58	4 400	129	56	28 058	264
Pécs agglomeration, total	-3,6	3,7	435	16	115	4 788	164	55	38 080	301
AGGLOMERATING AREAS										
Balaton Agglomerating area, total	-5,5	2,4	470	33	8	8 472	245	219	1 177 277	386
Eger Agglomerating area, total	-2,7	4,2	476	12	97	5 444	192	79	90 420	307
Szombathely Agglomerating area, total	-4,7	1,7	495	12	30	4 080	154	53	17 343	340
Zalaegerszeg Agglomerating area, total	-3,8	2,3	501	9	13	5 158	169	65	11 446	324
SETTLEMENT-GROUPS OF LARGE TOWNS										
Békéscsaba Settlement-group, total	-6,1	5,2	438	10	11	3 008	160	82	39 229	284
Debrecen Settlement-group, total	-1,5	5,1	447	11	112	9 471	167	52	18 478	290
Kaposvár Settlement-group, total	-3,5	4,4	451	4	34	4 800	167	57	3 670	317
Kecskemét Settlement-group, total	-1,8	3,6	454	20	29	4 675	170	59	4 298	335
Nyíregyháza Settlement-group, total	-1,1	4,8	464	18	60	4 709	197	71	6 307	309
Salgótarján Settlement-group, total	-9,6	9,2	420	3	5	5 300	112	61	5 124	277
Sopron Settlement-group, total	-1,7	0,6	452	26	47	2 701	141	63	35 054	364
Szeged Settlement-group, total	-2,3	2,7	445	19	114	6 763	164	61	31 426	279
Szekszárd Settlement-group, total	-3,5	3,5	459	6	17	4 698	174	53	6 797	345
Székesfehérvár Settlement-group, total	-2,2	3,1	496	9	16	9 496	167	50	3 054	341
Szolnok Settlement-group, total	-3,8	4,4	469	7	24	5 474	144	57	3 071	276
Tatabánya Settlement-group, total	-3,9	2,4	465	7	5	4 311	135	46	18 521	305
Veszprém Settlement-group, total	-1,0	2,3	512	19	83	4 433	154	56	4 423	305
Settlement-groups, total	-2,8	2,9	448	18	58	5 502	181	62	1 794 537	323
National total	-4,1	4,1	436	13	32	4 524	165	56	3 264 140	298

Source: author's own construction based on HCSO (2012)

That is why I have chosen those indicators which are the most suitable to characterize the competitiveness of Hungarian urban micro-regions. In the meantime, the indicators in Table 3 are also presented in Table 1 in some form. However, the internationally recognized indicators cannot always be appeared in the same form in the Hungarian regional statistical system. In these cases, I tried to find the most similar as well as the most appropriate index. For instance, several indicators present unemployment rate in Hungarian system. I chose the

rate of job-seekers registered over 180 days which is one of the most characteristic unemployment indices.

Lengyel and Szakálné Kanó (2012) determine four types of Hungarian micro-regions in terms of their specific developmental phases such as Budapest and micro-regions around it, manufacturing micro-regions, university towns and stagnated urban micro-regions. The Budapest Metropolitan Region is the economically most advanced area of the country, offering wide range of urbanization advantages. Since the change of the political system, the capital city managed to keep its leading position in the economic development and modernisation of the country in most respects (Kovács et al. 2011, Lengyel – Szakálné Kanó 2012). The suburban area around Budapest has received people moving out of the city. The weight of Budapest is disproportionately large in terms of the number of firms, as well as regarding the number of employees and the revenues generated by enterprises. It must be emphasized that following the turn of the millennium the weight of Budapest steadily increased.

Although, according to the classification of Lengyel and Szakálné Kanó (2012) the manufacturing micro-regions have significant FDI and export performance as well as it can be characterized by high employment but the labour productivity is quite low and foreign-owned companies do not provide a broad supply base. University towns have excellent human capital but they have not any remarkable export-oriented enterprise. The least competitive stagnated urban micro-regions are surrounded by rural settlements in most of the cases having low-level economic performance thus being quite vulnerable (Lengyel – Szakálné Kanó 2012).

4. Conclusion

The growing significance of city-regions originates in an ongoing process of globalization, which puts considerable pressures on national economies and local political - administrative systems to improve their position in a highly competitive international context. Under the globalization and localization, the development of economy and technology has not only enhanced the roles of cities in global activities and local affairs, but also intensified competition among cities. In the context of global competition, some cities are increasing in population and economic position, while some cities are suffering economic decline.

The competitiveness and development of city regions have been analysed from different scientific perspectives, in order to give an answer to the following questions: How does one city region create more economic activity and hence more income for its citizens than others?

What special characteristics or attributes lead to generating this higher income? What standard should be employed to determine whether a city region is competitive or not? Indeed why is it even interesting to measure competitiveness? How does economic competitiveness differ from intercity competition for workers, firms and capital? These kinds of issues are arisen when one tries to find the answer to the question how could urban competitiveness be measured?

A city region can be considered to be competitive if it has in place the policies and conditions that ensure and sustain a high level of per capita income and its continued growth. To achieve this, a city region should be able equally to attract and incubate new businesses and provide an environment that is conducive to the growth of existing firms.

Taking into account some internationally recognized index systems as well as by selected competitiveness indicators from Hungarian regional statistical system, we can measure the competitiveness of urban micro-regions.

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10. The Role of Unemployment in the Regional Competitiveness

Bettina Martus

By the emergence of the global competition regional competitiveness becomes more and more important. According to the Organisation for Economic Co-operation and Development and the European Union, the relative high rate of employment and incomes are necessary for competitiveness. Employment and incomes are very important but we must not forget that unemployment is one of the most significant problems within the European Union nowadays. Rising unemployment rates decrease regional living standards and competitiveness.

Unemployment may have many causes. Different enterprises have different reasons to pay higher salaries compared to the market clearing wage. This results in reduced employment and a move away from equilibrium. Higher wages may enhance labor productivity - another reason for companies to apply them. In my study[1] *I will demonstrate different models to analyze corporate decisions which can be the reasons of wages being raised above the market clearing wage. My main aim is to study the role of the unemployment according to the regional competitiveness. Most of the competitiveness gradations contain unemployment as an indicator but what kind of role has it? Have the employment and unemployment a positive strong nexus on the regional competitiveness or not?*

Keywords: unemployment, EU, competitiveness

1. Introduction

Unemployment presents a significant issue in several developed and developing countries. The number of young as well as permanent unemployed people is remarkable in more countries of the European Union. Although several regional and interregional program and objective were established to resolve the problem, the desired effect has not been achieved. So why is this such an important question, why do we have to deal with it? Because it is not only the people's subsistence and standard of life that depends on it, but also the regional competitiveness which serves the regional economy development.

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The regional differences became more pronounced in Hungary at the beginning of the 1990s – after the change of the political system. Many people could not find jobs, production relapsed, the economic structure was transformed (Rechnitzer 2000). Since the 2000s and since Hungary's entry into the EU in 2004, the concept of regionalism and regional competitiveness gathered more ground. Raising competitiveness and employment are among the main objectives of the European Union. Already the Lisbon strategy (to be accomplished by 2010) indicated: the European Union is to become the most competitive and most dynamically growing economy, increasing social efficiency and employment (EP 2010). Having failed to achieve this goal by the target deadline, and revisiting the plans, the EU 2020 Strategy was developed with the following objectives: intelligent growth (knowledge and innovation), sustainable development (resource efficiency, competitiveness) and inclusive growth which ensures high level of employment (EB 2010).

Thus we can see that competitiveness and employment constitute a crucial element of the international politics. But how do these two objectives link together? My study first presents the significance of competitiveness, one of its metric methods, and then I will look at unemployment and its causes which bear a close relation to competitiveness. The correlation between competitiveness and unemployment is studied through statistical methods in respect of the NUTS-2 level regions as defined by the European Union.

My research analyses economic activity, per capita GDP and unemployment. I aim to reveal the relationship between the three factors as supposing that the economic activity is high, the per capita GDP is also expected to increase and this will decrease the unemployment rate. But is this really the case?

2. Defining and measuring competitiveness

The media talk more and more about competitiveness. No wonder, since with Hungary's entry into the EU in 2004, we have become the members of the EU and consequently we aim to achieve the common goals. With the establishment of the European Union, the member countries aim for the highest possible level of development which makes Europe competitive.

It is worth to get an insight into the history of the EU, because the member states have made several attempts to achieve national and international competitiveness since its

establishment. Raising the Structural Funds (previously ERDF) constituted perhaps one of the major milestones in the history of Europe because this resource ensures the realisation of the political goals (Farkas 2000, Lengyel 2003). With the establishment of the Fund the member countries were to moderate the notable regional differences thus balancing development and growth in respect of the member countries.

Further significant step towards competitiveness were marked by the Amsterdam Treaty, creation of the common single market as well as the Luxembourg Summit in 1997 for the amelioration of employment politics (Farkas − Várnay 2011). As formulated by the Union by 2010, the aim of the Lisbon Strategy is, as previously mentioned, to achieve the most competitive and most dynamically developing knowledge-based economy, which, unfortunately, could not be realised by the target date due to numerous reasons (EP 2010).

The means hereby listed renders only a small segment of the EU's instruments of competitiveness, however, they all intend to achieve development, to increase employment, to help enterprises as well as to increase the number of enterprises, to lift the standard of life of local habitants, to encourage R&D activity and to integrate equity. The EU 2020 Strategy is the most recent objective of the European Union which sets similar goals with the deadline of 2020 to achieve competitiveness. We can see that competitiveness is indeed the major aspect of the different provisions, but what does this concept really mean?

In Lukovics's terms (2008, p. 8.), competitiveness is „*the capability of enterprises, industries, nations or supra-national regions to permanently establish relatively high factor-earnings and relatively high employment level while being exposed to global competition*." "*The competitiveness of the regions means the ability to generate products and services which can be sold at the national as well as at the international markets while the citizens reach a an increasing and sustainable standard of life*" (Lengyel 2010, p. 118.). Regional competitiveness means the acceleration of endogenetic development which provides support for the enterprises and reinforcement for their innovation potential (Lengyel 2009, Lengyel 2010).

Several concepts of competitiveness use the expressions „standard of life," „income," „sustainability" whose base is certainly the utilization of endogenetic resources. Such definitions are embedded in the EU's sixth regional report, in the European Competiveness Reports, in Enyedi's concept of competitiveness, Török's and Botos's definitions (Botos 2000). These also show that per capita GDP, labour productivity and employment rate bear strong emphasis when

measuring competitiveness since these factors significantly influence the regional welfare (Lengyel 2010).

After completing the empiricism of my study, I proceed with the Huggins-model (2003) which is a three-level regional competitiveness model. The first level includes the factors that represent the inputs that are those which influence competitiveness in the long run (enterprise density, knowledge-based companies, economic activity). The second level contains productivity (with which we measure competitiveness) and the third level represents the results of the competitiveness (salaries, unemployment). But are these factors really the ones that determine the level of unemployment? Hereinafter, I will demonstrate unemployment and its reasons, furthermore, I will examine to what extent economic activity and per capita GDP correlate and how these relate to unemployment. As the factors hereby examined are included in numerous indicators of competitiveness, these data are supposed to bear a strong interaction with each other. Most indicators of competitiveness utilise unemployment as well when examining the competitiveness of the regions, therefore it is not this indicator that define the level of unemployment but t serves as a basis for it. Nevertheless, in the present case unemployment is not considered as an indicators defining unemployment but as an output defined by competitiveness.

The statistical data were collected for the NUTS-2 regions of the European Union. This planning and statistical region includes areas with population between 800 000 and 3 millions, out of which there are currently 273 in the European Union. Data were downloaded from the EU's official website, the Eurostat. I have examined three indicators during my research: GDP/capita (productivity), activity rate and unemployment rate. As for the time periods, I have surveyed three years: 2000, 2005 (years before the crisis) and the post-crisis 2010. The statistical data for 2000 and 2005 are sometimes incomplete, therefore these years do not yield a clear image in my research, however, the 2010 statistical can be considered complete. My study analyses the 10 supposedly most competitive and the 10 supposedly least competitive regions per annum, along with their activity and unemployment rates. According to Huggins's model, productivity will be defined by enterprise density, by the number of knowledge-based companies and by the number of economically active people. My study takes only the activity rate as a basis, looking at the effects of this indicator on the GDP produced (that is on competitiveness). To Huggins, the output is (the decrease of) unemployment and the increase of salaries. The activity

rate and the unemployment rate hereby examined refer to age group 15 and above because there is no data available at the Eurostat website for the age group 15-64 prior to 2007.

Table 1 indicates the correlations between GDP/capita, activity rate and unemployment rate in 2000, 2005, 2010. As we can see, there was no relation between GDP and activity rate in 2000 and 2005 but in 2010 there was a relative strong relation between these two indicators. We can see the correlation of the GDP/capita and the unemployment rate too. In examined years there were strong negative relations between these two indicators which means when the GDP/capita increased the unemployment rate declined.

Table 2 indicates that the 10 most competitive regions (based on GDP/capita) have not changed a lot during the past years. Their high GDP rate (around 60%) links with relatively low unemployment rate. In 2000, there were only 2 regions among the best 10 which had an over 10% unemployment rate and in 2010 there are no such regions among the best 10, what's more, the unemployment rates of the previous years have become lower while the activity rates, similarly to the GDP produced have become higher in these regions. This means that more economically active people could contribute to increasing competitiveness and decreasing unemployment. The indicators examined could certainly be influenced by further factors but we can detect their interaction.

Table 3 shows interesting data. Although Romania and Bulgaria joined the European Union only in 2007, I could obtain date also for these countries from the Eurostat website and thus we can see how these two countries developed before and after the EU entry (if they have). Examining the three years clearly shows that approximately the same NUTS 2 regions occur among the least competitive regions. These data of 2000 indicates regions with relatively high activity rate and low unemployment rate and vice versa. The year 2005 seems more balanced, productivity increased in the regions, the activity rate is around 50-55% and the unemployment rate around 10%, or in most cases even more. By 2010 these figures render an even clearer image. The weakest of the 10 regions has the lowest activity rate and it links with relatively high unemployment rate, compared to the other nine regions. We can see that it is not necessarily the area with the least number of economically active people which will be the least productive, however there interaction with each other, as well as with the unemployment rate can be demonstrated. In the first half of the 271 NUTS 2 regions, we can often trace unemployment rates of 3-4-5% which naturally couples with high competitiveness. On the other hand, quarrying the

second half of the hierarchy, we see decreasing competitiveness and 9-10% or even higher unemployment.

Table 1 Correlation between GDP/capita, activity rate and unemployment rate

		2000 GDP/capita	2000 Activity rate	2000 Unemployment rate
2000 GDP/capita	Pearson Correlation	1	-,032	-,465**
	Sig. (2-tailed)		,606	,000
	N	265	265	265
2000 Activity rate	Pearson Correlation	-,032	1	,272**
	Sig. (2-tailed)	,606		,000
	N	265	265	265
2000 Unemployment rate	Pearson Correlation	-,465**	,272**	1
	Sig. (2-tailed)	,000	,000	
	N	265	265	265
		2005 GDP/capita	2005 Activity rate	2005 Unemployment rate
2005 GDP/capita	Pearson Correlation	1	-,024	-,415**
	Sig. (2-tailed)		,702	,000
	N	265	265	265
2005 Activity rate	Pearson Correlation	-,024	1	,249**
	Sig. (2-tailed)	,702		,000
	N	265	265	265
2005 Unemployment rate	Pearson Correlation	-,415**	,249**	1
	Sig. (2-tailed)	,000	,000	
	N	265	265	265
		2010 GDP/capita	2010 Activity rate	2010 Unemployment rate
2010 GDP/capita	Pearson Correlation	1	,445**	-,349**
	Sig. (2-tailed)		,000	,000
	N	270	270	270
2010 Activity rate	Pearson Correlation	,445**	1	-,298**
	Sig. (2-tailed)	,000		,000
	N	270	270	270
2010 Unemployment rate	Pearson Correlation	-,349**	-,298**	1
	Sig. (2-tailed)	,000	,000	
	N	270	270	270

Source: Eurostat (2013)

Table 2 Order of the 10 most competitive regions based on GDP/capita (Euro) with the respective (over 15, %) activity and (over 15, %) unemployment rate for 2000, 2005 and 2010

2000				2005				2010			
NUTS 2	**GDP/ inhabitant**	**Economic activity rate**	**Unemployment rate**	**NUTS 2**	**GDP/ inhabitant**	**Economic activity rate**	**Unemployment rate**	**NUTS 2**	**GDP/ inhabitant**	**Economic activity rate**	**Unemployment rate**
Inner London	69 100	63,12	9,4	**Inner London**	83 500	62,08	7,8	**Inner London**	81 100	62,39	9,7
Luxembourg	50 300	53,41	2,3	**Luxembourg**	65 000	55,56	4,5	**Luxembourg**	78 600	57,70	4,4
Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest	50 000	51,56	14,9	**Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest**	57 300	53,86	16,3	**Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest**	61 300	55,47	17,3
Dresden	43 700	59,16	15,9	**Dresden**	51 100	58,77	18,3	**Hovedstaden**	52 300	67,61	7,8
Hamburg	42 100	58,90	7,8	**Hovedstaden**	46 700	:	:	**Hamburg**	52 200	61,32	7,1
Stockholm	42 000	74,48	3,2	**Hamburg**	46 000	59,88	10,4	**Stockholm**	50 700	75,01	7,1
Hovedstaden	39 200	:	:	**Stockholm**	45 900	74,42	6,7	**Île de France**	49 800	61,03	8,9
Île de France	37 100	61,66	8,7	**Eastern**	43 400	62,66	4,3	**Groningen**	48 700	62,94	5,3
Oberbayern	36 400	61,82	3,0	**Île de France**	42 300	61,62	9,0	**Helsinki-Uusimaa**	45 400	66,63	6,4
Wien	35 900	60,20	7,5	**Buckinghamshire and Oxfordshire**	40 400	68,95	3,5	**Wien**	44 300	59,99	7,3

Source: Eurostat (2013)

Table 3 Order of the 10 least competitive regions based on GDP/capita (Euro) with the respective (over 15, %) activity and (over 15, %) unemployment rate for 2000, 2005 and 2010*

2000				2005				2010			
NUTS 2	**GDP/ inhabitant**	**Economic activity rate**	**Unemployment rate**	**NUTS 2**	**GDP/ inhabitant**	**Economic activity rate**	**Unemployment rate**	**NUTS 2**	**GDP/ inhabitant**	**Economic activity rate**	**Unemployment rate**
Yugoiztochen	1 800	48,35	21,4	**Nord-Vest**	3 500	51,94	5,9	**Nord-Vest**	5 200	53,75	6,8
Nord-Vest	1 700	63,01	7,0	**Sud-Est**	3 200	51,55	7,9	**Sud-Est**	4 800	52,23	8,8
Severoiztochen	1 600	51,90	21,9	**Sud - Muntenia**	3 100	54,95	9,2	**Sud - Muntenia**	4 800	55,62	8,3
Sud-Est	1 600	63,57	8,9	**Sud-Vest Oltenia**	2 900	57,10	6,6	**Sud-Vest Oltenia**	4 500	56,96	7,5
Severozapaden	1 500	43,23	27,9	**Yugoiztochen**	2 800	48,31	8,3	**Severoiztochen**	3 900	53,63	14,5
Sud - Muntenia	1 500	67,37	6,6	**Severoiztochen**	2 600	51,98	12,1	**Yugoiztochen**	3 900	50,49	10,6
Sud-Vest Oltenia	1 500	71,12	5,0	**Nord-Est**	2 500	58,59	5,7	**Nord-Est**	3 600	58,49	5,8
Severen tsentralen	1 400	48,32	16,7	**Severozapaden**	2 300	42,88	12,6	**Yuzhen tsentralen**	3 300	50,90	11,4
Yuzhen tsentralen	1 300	49,44	13,0	**Severen tsentralen**	2 300	47,37	12,5	**Severen tsentralen**	3 100	47,43	11,5
Nord-Est	1 300	70,57	6,8	**Yuzhen tsentralen**	2 300	48,83	11,0	**Severozapaden**	2 900	44,96	11,0

Source: Eurostat (2013)

Note: * The 10 least competitive regions are only authoritative in 2010, because in 2000 and 2005 the Eurostat database indicated the lowest per capita GDP for Romania and Bulgaria among the NUTS 2 level countries whilst these countries were not yet EU members in 2000 or 2005.

Therefore Huggins's three-level competitiveness model does show regularity in respect of the NUTS 2 level regions of the European Union. Although this tendency does not necessarily appear in case of the first to tenth member of the order, on the whole, the more competitive regions had high activity rate in 2010 and low unemployment rate in most cases. The exceptions show regularity because of the presence/absence of the other factors – which were not examined by me. But if competitiveness means low unemployment, then how can this phenomenon emerge in the most competitive countries/regions? The following chapters examine the possible reasons behind the evolution of unemployment.

3. Development and concepts of unemployment

These days unemployment presents one of the biggest problems all over Europe. Although Hungary is among the member countries of Europe and applies the principle of the "four liberties", the local labour force is often caught in a difficult situation. The economist politicians failed to confine the increasing unemployment, either via the Hungarian economic politics, or via the EU objectives and programs. Similar problems arise in several countries of the Union, for example in Spain where youth unemployment poses the biggest issue, but we can find this phenomenon worldwide. This growing problem has negative effects also on the regional competitiveness. The relatively high incomes and relatively high unemployment fail to supervene. But how can these conditions and competitiveness achieved, if the relatively high incomes result in a shift from the equilibrium income? If market-clearing wages need to be applied, then sooner or later involuntary unemployment evolves. Can we talk about unemployment at all?

The neoclassic school within the economic paradigms says no claiming that prices and wages are perfectly flexible at the labour market, the market balance is achieved and there is no involuntary unemployment (Blahó 2012). However, this is contradicted by Keynes. Followers of the neoclassic theory believed in the automatic fulfilment of full employment. On the other hand, Keynes aimed to find what determines the level of employment if automatisms of the capitalist economy do not entail full employment (Mátyás 2003, Deane 1997, Hansen 1965, Blahó 2012, Szentes 1995). Operation of the market does not satisfy demand and hence unemployment

unfolds (Keynes 1965). Thus we can find ourselves in thinking in Keynes's terms when talking about unemployment which, in turn, has unfavourable effects on competitiveness.

But why is this important from the aspect of competitiveness? Because according to the universal concept of competitiveness, high standard of life can be reached by maintaining high employment rate, therefore the unemployment rate should remain low and the economic activity should be raised as much as possible, as employment of inactive people could also contribute to development. On the whole, decreasing unemployment can help in achieving the aim of competitiveness. But then why do not companies concede this and aim for higher employment since this could provide more opportunities to companies? With the increase of the employment rate, they could gain in an environment which could ensure higher growth (profit) and larger market for them. Then why do not they apply market-clearing wages? In the following chapter I will present the reasons behind increasing the numbers of the unemployed and thus decreasing the ratio of the employment level.

4. The reasons behind unemployment

There can be several reasons behind companies increasing wages over the market-clearing wages in their most rational way and thus they take a negative effect on movement of the unemployment rate. Makdissi (2011) counts the following reasons which could result in a shift from the equilibrium income: long-term contract model, efficiency wage model, nutritional model, labour turnover model, shrinking model and social model.

The *long-term contract model* – as its name shows - is based on the long-term collective agreements. The theory claims that the parties (employer and employee) agree on common issues and a sort of negotiation process commences between them which sets the level of future nominal wages (Fischer 1977, Barro 1977). Since these contracts are for long term, the parties have to wait for their contract to end before renegotiating the nominal wages. Estimates for the future price level are crucial in this process, because in case the price levels take different directions (the actual and the estimated), unemployment might evolve. The reason why pre-defined wages can result in unemployment in this case is that for example a time of recession might present active people who are willing to undertake the same job for lower wages. Wages remain in effect for long term but gradual salary adjustment techniques are applied during the contract which

observes the effective price and wages at the competitors (Taylor 1979, Taylor 1980). This serves as a sort of information to the workers and to the enterprises, and also as one of the factors of defining the new level of nominal wages at the end of the contract, the other being the labour market.

This model shows us that the rigidity of wages extruded the unemployed out of the labour market because real wages' rigidity along with wages over the equilibrium results in the labour force supply exceeding demand (Mankiw 2005), thus estimates play a crucial role in the negotiation process. Mankiw (2005), Hall and Taylor (2003) also highlights the crucial role of the trade unions. They may have a significant role in the negotiation position of the employees and thus they often receive more money from their employees to discourage them from joining the unions.

The next model is the efficient wages' model which contradicts the standard micro-economic theory. According to the micro-economic theory, wages equal the border productivity of the labour force, but here it is the salary level that defines the border productivity of the labour force. This means that if we increase the employees' wages, their productivity will also increase, that is the salary appears as a motivating factor here. This manner encourages companies to pay more to the employees to make them more productive, says this model. However, the increase shift the wages from the level of the market-clearing wages which means that supply and demand will not meet at the labour market, which will then result in unemployment (Makdissi 2011). This model may explain why employers do not decrease their employees' wages there is oversupply at the market (Mankiw 2005).

The *nutritional model* explains unemployment in the developing countries. The theory supposes that market-clearing wages are not sufficient to supply the third world's habitants with healthy / appropriate food that is to take in alimentary substances that are able to ensure concentration and effort during work all day. However, if we increase these wages and shift from the market-clearing wages, then quality of the consumed nutriment will also increase which raises the whole, consequently also the labour productivity. Similarly to the efficient wages model, shift from the market-clearing wages (increase) results in unemployment in this case, too (Makdisi 2011, Mankiw 2005). Naturally, we have to add that there are several other factors in the developing countries that contribute to the development of this process, since insufficient number of jobs, lack of qualification, etc. are also factors that obstruct development. The

employees' demands have to be fulfilled not only in physical terms but also mentally which is often difficult, as the developing world is characterised by brain drain, migration of the qualified (Wouterse 2011, Urbán 2011, Akokpari 2006), along with lack of demand for the unqualified.

When we employ a new employee, there are certain costs for the company. The expenses related to their orientation and training are significant for the employers, since once the employee is trained for the position, they will be considered as qualified, internal labour force which is valuable for the company. The *labour turnover model* disunites the external (that is inexperienced) employees and the trained, experienced colleagues (Salop 1979). In case the more senior employee leaves the company, the expenses incurred during in connection with his training and orientation are a loss for the company, in addition, recruitment of the new colleague also raises uncertainty. The employer has to assume more responsibility to avoid this uncertainty which can mainly be achieved by increasing the wages because the employee with low wages (for example market-clearing wages) may believe that they could easily find a job at another place with their knowledge and skills (Salop 1979). The labour turnover model confers an important role on the unemployment. Prior to quitting, the employees first "examine" the labour market opportunities, because if they have little chance to find a new job, they rather stay with their current employers or they may become voluntary unemployed. Increasing the wages may also extrude the active job-searchers who would work for lower wages while companies can employ less people with the increased labour costs. Nevertheless, it is often necessary for the employers to raise the wages because the new employee pertains to lower productivity, even by starting the training immediately, their inexperience withdraws their productivity (Salop 1979).

The employees use their discretion in deciding on the efforts made in order to complete their tasks. Although it is rather difficult to measure the employees' performance, in case the company thinks that the employee does not perform their work well, they may be sacked. If we calculated with the market-clearing wages at the labour market, then practically the employees would not have any motivation to perform more than the minimum in their work. If the employee is sacked, it will be easy to find a new job because these wages establish the balance, the new job will offer the same wages than the previous one.

In *the shrinking model*, the companies increase wages to avoid employees who are not performing well and thus provide more motivation. Certainly more people would like to avoid this sort of labour force and therefore their reaction will also be the salary increase and increase

of the labour cost will result in unemployment. If the unemployment rate is high, wages play less significant role because it would be difficult to find another job. This model also provides explanation for why different employers pay different wages to the employees despite the nearly identical work they perform (Shapiro − Stiglitz 1984).

The last model that provides reason for the unemployment is rather sociological (psychological), as suggested by the name: *social model*. In this theory, rewarding has a central role which can be realised by promotion or higher wages. The employer grants higher remuneration for the employee as a gift which then increases productivity. The employees receive higher salary if their performance exceeds the minimum requirements defined by the employer. The company is willing to pay additional amount to its employees which they could receive at another company for their work. It is important to highlight that we cannot consider the labour force simply as a production factor, but as a person with whom we have to work together; promotion and rewarding must be given prominence (Hyman 1942). It is also to be noted that rewarding should not be too frequent to make it pleasant. At the outset of the application, common conditions are established and expected by both parties, if the employer motivates the labour force with additional factors, productivity will increase. Certainly the gift cannot be defined individually, only for groups. Working in teams may help the employees, certain team norms will evolve and the sense of belonging somewhere may facilitate the employees' contribution towards the company and their colleagues. Increasing the teams' wages may of course also lead to the development of unemployment because we shift from the market-clearing wages (Akerlof 1982).

The models above present the micro-economic bases of the development of unemployment. Certainly the factors listed above all increase the unemployment rate which serves as a base for several competitiveness index, therefore competitiveness will expectedly decline being aware of this factor. The Huggins-model may eventually provide explanation for the development of unemployment in the most competitive regions.

5. Conclusion

Unemployment is an important tool of economic politics. Many companies/regions aim to keep the unemployment rate at a low level in order to improve competitiveness because the main goal is to permanently establish relatively high wages and relatively high employment level.

Huggins's model provided the basis for my research in which I have examined the relationship among activity rate, per capita GDP and unemployment rate. The economically active people serves as the output, to measure competitiveness, I have considered productivity as basis and changes of the unemployment rate as output. The subjects of my study were the NUTS 2 level regions of the European Union which proved the relationship among the three factors. Several competitiveness index considers unemployment as the determining indicator of competitiveness but on the whole we end up with the same results at Huggins. Low unemployment rate yields higher competitiveness and higher competitiveness links with lower unemployment rate.

If the ultimate goal is keep the unemployment rate at a low level in both cases, why do not economist politicians establish the conditions of full employment? Can they do it at all? The answer is: no. The involuntary unemployment emerges in any case as it is the situation between employers and employees that define the shift from the equilibrium wages. My study presented the unemployment models that resulted in a shift from the market-clearing wages.

To conclude, the importance of keeping the employment rate permanently at a high level has become evident in establishing regional competitiveness. This can be achieved by increasing the ratio of economically active people and by trying to keep the unemployment rate at the lowest possible level.

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PART THREE

Regions and Innovation Systems

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11. Institutional and Regional Factors Behind University Patenting in Europe: An Exploratory Spatial Analysis Using EUMIDA Data

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Over the past 30 years universities have been increasingly considered as key instruments of regional economic development policy in many countries of the World. Contrary to the US where studying the entire universe of academic institutions is a real possibility thanks to the availability of regularly collected nation-wide information on all universities in Europe no such coordinated data collection efforts are in existence. This is why the EUMIDA database constitutes such a pioneering work. In this paper we take advantage of the availability of the EUMIDA data for scientific investigations.

We selected to focus on one specific, widely promoted form of academic entrepreneurship: university patenting. Following what the literature teaches us about the likely institutional and regional level impacts on academic entrepreneurship we utilize EUMIDA information to build as large a sample as possible to study European-wide tendencies of university patenting. Regional level impacts are investigated at the NUTS 3 level, which is in itself a novelty in the literature. This lower level of data aggregation opens the possibility to get closer to the spatial level of metropolitan areas where university-industry interactions most probably take place.

Keywords: EUMIDA, university patents, regional knowledge production function, European regions

1. Introduction

Over the past 30 years universities have been increasingly considered as key instruments of regional economic development policy in many countries of the World (Pike et al. 2011). High expectations towards positive regional economic impacts of academic institutions are partly supported by the experience of some leading technology areas where knowledge transfers from universities successfully nurtured regional economic growth (Saxenian 1994, Wicksteed et al. 2000, Goldstein 2002) and partly by research findings in the scientific literature providing strong empirical evidence as to the important role of spatial proximity of firms to academic institutions in knowledge transfers (Varga 1998).

It became clear for researchers of the field relatively soon that a pure proximity of a university is not a guarantee for growth as regional and university level characteristics are both instrumental in determining the extent to which university-supported economic development might be considered as a realistic option for a region. Without some preconditions in the locality even a world-class research university might exert only

[1] The research underlying this study was supported by the MTA-PTE Innovation and Economic Growth research group (14121) project.

negligible impacts on the local economy (Feldman 1994). The literature shows that below a certain threshold of agglomeration of the local knowledge industry (including innovative firms, private research labs, business services, supporting institutions) hopes for a significant university impact are more or less non-realistic as indicated by US (Varga 2000, Koo 2007) and European (Varga et al. 2012) investigations. In the absence of absorptive capacities in the region research conducted at its universities might be the source of growth in other territories where the local innovation environment have already been satisfactorily developed (Azagra-Caro et al. 2013).

Studies focusing on specific mechanisms of academic knowledge transfers provide additional information on those regional and institution-level characteristics that might be instrumental in university-supported regional growth. Knowledge flows from universities to the local industry can take various forms ranging from regional mobility of university graduates and joint research with industry to informal knowledge spillovers between academic and industrial scientists (Varga 2009). One specific channel of academic knowledge transfers frequently called "academic entrepreneurship" attracts an especially intense attention of researchers and policymakers alike. Academic entrepreneurial activities include disclosing, patenting or licensing economically useful new technological knowledge developed by university faculty, spinning-off a firm from academic laboratory research or professional consulting offered by scientists working at academia (Louis et al. 1989, Gulbrandsen − Slipersaeter 2007).

Some of the academic entrepreneurship studies bring further evidence on the importance of the *regional environment* for academic technology transfers. Based on the sample of 404 companies from 64 Italian universities Fine and his co-authors (2011) conclude that *innovative performance* of the region as well as the size of its *public R&D expenditures*, or the presence of regional *support institutions* (such as incubators) significantly influence university spin-off firm formation. According to the study by Saragossi and Van Pottelsberghe de la Potterie (2003) patenting at Belgian universities is supported by the presence of collaborating institutions in the region specializing in the *same field of research*. Additionally, Siegel and his co-authors (2003) report that their 98 interviews at five research universities suggest that there is a positive association between *R&D conducted by local firms* and the productivity of technology transfer from the universities. However, the regional impact does not always get evidenced such as in Acosta and his co-authors (2011) where the extent of university patenting in Europe does not appear to be influenced by regional factors.

Academic entrepreneurship studies also reveal that certain characteristics of universities may influence knowledge transfers from academia. *Research intensity* of universities affects the effectiveness of university technology transfer offices (TTO) positively in the sample of 131 US universities (Rogers et al. 2000). Positive effects of university research intensity are found on patenting (Coupé 2003) and licensing (Lach − Shankerman 2003) for samples of US universities and for the University of Valencia (Azagra-Caro et al. 2003). *University size* impact on the extent of academic technology transfers varies by scientific areas for a sample of 4000 Canadian university researchers in Landry and co-authors (2007) and for TTO effectiveness with a sample of 170 US universities in Carlsson and Fridh (2002). The size effect is also found prevalent for the number of licenses and the amount of royalty income for a sample of 90 US universities (Friedman − Silberman 2003) and for different types of university-industry linkages at Austrian universities (Schartinger et al. 2002) and in two wine clusters (Giuliani − Arza 2009).

Third party research funding from governmental and private sources is positively related to license income in Lach and Shankerman (2003) and to the intensity of science-industry relations on the basis of a survey of 4900 researchers in Ponomariov (2007). Licensing (Friedman and Silberman 2003, Lach and Shankerman 2003), university-industry linkages (Guiliani − Arza 2009, Ponomariov 2007) and faculty entrepreneurial performance at the Catholic University of Leuven (Van Looy et al. 2004) are also positively associated with *faculty quality*. *TTO*s don't seem to matter in faculty spin-offs for a sample of biotechnology firms in Hungary (Erdős − Varga 2012), but the quality of TTOs found to be positively associated with TTO productivity when a sample of 55 academic entrepreneurs are interviewed by Siegel and his co-authors (2003) and when 131 US universities are surveyed in Rogers et al. (2000). Furthermore, positive impacts of *university prestige* on entrepreneurial performance (Van Looy et al. 2004), of *scientific specialization* on technology transfer intensity (Landry et al. 2007) and of a supportive *departmental environment* on patenting (Renault 2006) and spin-offs (Erdős − Varga 2012) are reported in the literature.

Thus the literature suggests that individual university characteristics and regional features explain much of the observed differences in academic entrepreneurship. However, most of the studies referred above are based on relatively small samples of universities. This is less true for some of the US investigations where studying the entire universe of academic institutions is a real possibility because of the existence of data collected nationally on a regular basis such as the licensing surveys of the Association of University Technology Managers (AUTM 2011) or the WebCASPAR database maintained by the National Science

Foundation (NSF 2010). However for European universities no such coordinated EU-wide data collection efforts are in existence. This is why constructing the EUMIDA database constitutes such a pioneering work (Bonaccorsi et al. 2010).

In our study we take advantage of the availability of the EUMIDA data for scientific investigations. We selected to focus on one specific, widely promoted form of academic entrepreneurship: university patenting. Following what the literature teaches us about the likely institutional and regional level impacts on academic entrepreneurship we utilize EUMIDA information to build as large a sample as possible to study European-wide tendencies of university patenting. Regional level impacts are investigated at the NUTS 3 level, which is in itself a novelty in the literature. This lower level of data aggregation opens the possibility to get closer to the spatial level of metropolitan areas where university-industry interactions most probably take place (Varga 1998). The second section introduces the development of the novel regional EUMIDA data and then provides an exploratory analysis on institutional and regional factors behind university patenting. The third section follows the results of an econometric analysis. Summary concludes our chapter.

2. University patents, institutional and regional factors: A descriptive analysis

The EUMIDA project is a major step towards the development of a system of integrated European-wide data collection on higher education institutions (Bonaccorsi et al. 2010). EUMIDA data sets reflect what is currently available as a result of individual national data compilation efforts. Identification of the respective NUTS 3 regions for each EUMIDA institution required substantial efforts since the original national data tables do not contain the appropriate regional breakdown at the level of institutions (Bonaccorsi et al. 2010). In the followings we shortly summarize the major steps in the regionalization of the EUMIDA data.

Identification of each academic institution, their cities and then the determination of the corresponding NUTS 3 regions turned out to be extremely challenging. A series of systematic Internet-based searches appeared to be the most efficient data collection method. When institution names in the corresponding languages remained unchanged since the time of EUMIDA data collection a Google search appeared satisfactory for the identification of the university. However, when names of those institutions, which were subject to integration or separation had changed individually specified search methods were followed (e.g., detailed investigations on the existing institutions' home pages or data collections in Wikipedia) in

identifying the original institution. Once the original institutions were found on the Internet the next step was to determine the corresponding city names from the web pages.

Contrary to what is the case for example in the United States where a correspondence table with ZIP codes, city and county names are available there is no uniform correspondence between municipalities and regions in Europe. To earn this information on EUMIDA institutions' campuses we used mainly the following correspondence databases provided by Eurostat:

1. The system of Local Administrative Units (LAU) that contains correspondence between LAU and NUTS 3 codes. This correspondence was useful in the cases of those countries where the LAU 2 level coincides with municipalities and the names appear the same[2].
2. Eurostat provides a concordance between local postcodes, localities and NUTS regions in a special database (the "Postcodes and Nuts" database) that contains more alternatives of the locality names[3].
3. 3The case of the United Kingdom generated the most complicated identification processes. In this country LAU regions do not overlap with the boundaries of municipalities (and the names of these regions also do not refer to municipalities) and UK postcodes are not in the Eurostat "Postcodes and Nuts" database. We used the ArcGIS Explorer and Google Maps to localize the municipalities and the shape files of NUTS 3 boundary maps to determine the region of municipalities.

As the EUMIDA Final Study Report points it out (Bonaccorsi et al. 2010) no information is available on how institutional resources of a university are allocated to different campuses though it is obvious that a significant number of universities are multi-sited. Without a more appropriate solution we allocated university resources to the NUTS 3 regions where the municipality of the main seats of the institutions are located. In the case of multi-site universities (approximately 5 percent of the institutions) always the first address (city) was chosen or the one where the administrative center of the institution is located. With

[2] LAU-NUTS3 correspondence tables were usable in the following countries: AT, BE, BG, CY, CZ, DE, EE, ES, FI, GR, HU, IT, LU, LV, MT, NL, PL, RO, SE, SI, SK.
[3] "Correspondence tables: Postcodes and NUTS":
http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/correspondence_tables/postcodes_and_nuts

this method, we ended up with a one to one correspondence of universities and NUTS 3 regions[4].

Out of the universe of approximately 2900 higher education institutions in Europe the Core EUMIDA data set contains 2457 institutions, which covers 27 European nations. Because of insufficient data availability France and Denmark are not part of the Core data set. Resulting from a further data collection effort the Extended EUMIDA data set provides broader information but only for a select set of institutions, mainly for those with research orientation. Table 1 indicates that almost all of the research active (1360 out of 1405), doctoral degree granting (846 out of 886) and public (1071 out of 1380) universities in the Core EUMIDA data set are covered in the Extended data set. Provided that scientific quality correlates with the probability of patenting (Renault 2006) our investigations of the impacts of institutional and regional factors on university patenting are built on information provided in the Extended EUMIDA data set.

Following the related literature summarized in the Introduction and considering the availability of information in the Extended EUMIDA data set university-level characteristics to be accounted for in the analysis of university patenting are as follows:

- research intensity,
- institution size,
- external funding,
- education significance,
- scientific specialization,
- university prestige.

To control for knowledge accessed by university researchers from the international research community we test for the likely impact of *international embeddedness*. *Age of the institution* and *education significance* are added as further control characteristics.

[4] Even following the above-described methodology very carefully we still cannot ignore potential shortcomings in the resulting regionalized data. Reliability of the data is not balanced because we do not have knowledge about the extent to which information published on web pages of institutions is indeed relevant. In most of the cases it was obvious that the addresses of the institutions were correct. However, in some other cases we realized and tried to correct the apparent mistakes by for example further browsing on the pages. Also it is not easy to assess the reliability of the information earned from those web sites or online applications that contain information uploaded by users (e.g. Wikipedia, Google Maps). To restrict the level of risk, we insisted to use at least two Internet sources in every case to control for mistakes.

Table 1 Number of universities in the Core and the Extended data sets for selected variables

	Core data set	**Extended data set**
RESEARCH ACTIVITY		
No	1015	3
Yes	1405	1361
No information	37	
HIGHEST DEGREE AWARDED		
Bachelor	787	219
Diploma	59	6
Doctorate	886	846
Intermediary ISCED 6 qualification	5	5
Master	136	
Master or pre-Bologna equivalent	538	277
No information	46	11
LEGAL STATUS		
Government dependent	138	99
Private	933	193
Public	1380	1071
No information	6	1
Sum	2457	1364

Source: authors' own construction

On the base of the literature search the following regional characteristics of university patenting were selected for analysis:

- regional size (to control for agglomeration effects),
- regional university research intensity (to control for the potential impact of the concentration of public research in the region),
- industrial specialization (to control for potential university-industry interactions in technology development),
- regional innovation (to control for the innovativeness of the region).

Appendix tables A1 and A2 list all the variables from EUMIDA and additional data sources that could potentially serve as proxies of the above listed institutional and regional level characteristics. While selecting a particular variable to proxy any of the characteristics we followed three criteria. The first one is related to the size of the sample. Unfortunately, for most of the variables in the Extended EUMIDA data set values for many institutions are not

reported. As a consequence, for some of the variables the number of available observations became so low that it seriously jeopardizes representativeness. Figure 1 provides two examples for the bias caused by the low level of observations: overrepresentation of the UK and Hungary in the R&D expenditures variable (Figure 1a) and of Germany, the UK and some additional countries in the Foreign academic staff variable (Figure 1b).

Figure 1 Problems with representativeness in the Extended data set. Two examples: R&D expenditures and foreign academic staff

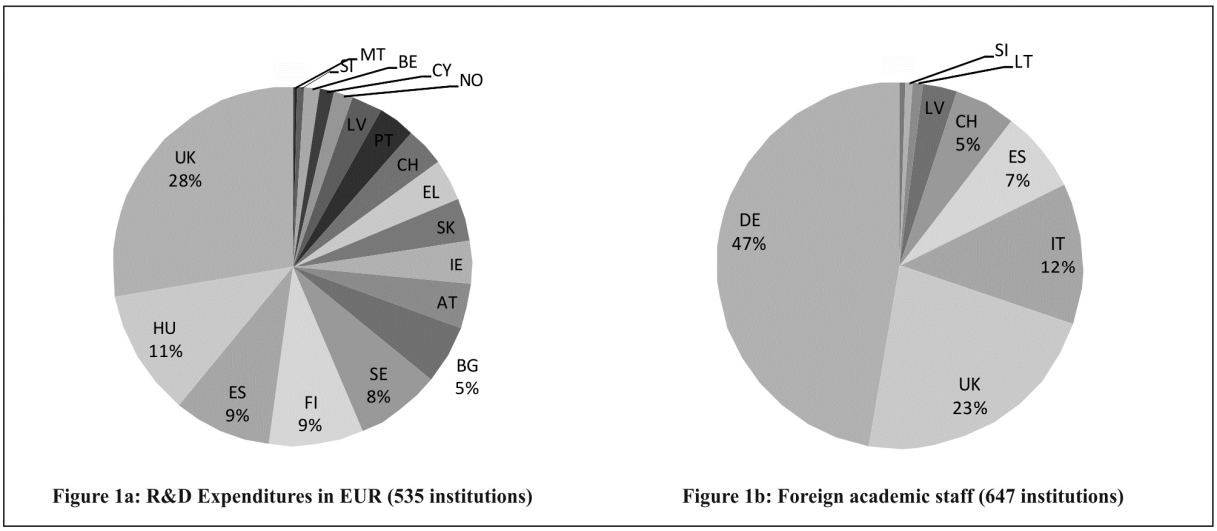


Figure 1a: R&D Expenditures in EUR (535 institutions)

Figure 1b: Foreign academic staff (647 institutions)

Source: authors' own construction

Additional to ensuring sufficient levels of representativeness by systematically searching for variables with the highest possible number of observations the second criterion was related to explanatory power. In Appendix tables A1 and A2 the main statistics of the regressions are presented. Parameter significances and regression fits advise as to which variable to select. The third criterion was associated with a systematic regression analysis presented in the following section (Tables 3 and 4). As indicated there for some of the characteristics each potential variable was included in the regression model one by one separately. Those variables that were selected for analysis showed the best properties with respect to regression fit and parameter significance.

Descriptive statistics of the selected variables are shown in Table 2. In general the spread of values are considerably high. While means are low, standard deviations in some cases are several times higher. Therefore most of the observations have values close to the respective minimums while some of the universities take outstanding values for all variables. We measure university patenting by the number of patents assigned to academic institutions

in the years 2006-2008[5]. Data come from the PATSTAT database maintained by the OECD[6]. The examined 1364 institutions have 823 patents altogether. Average number of patents per institution does not reach the value of one, but the high maximum value indicates the existence of some universities with intensive patenting activity. Number of doctoral degrees awarded is our proxy for research activity.

Table 2 Descriptive statistics of the selected variables

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Sum	Observations
University Patents with Priority Year 2006-2008	0.603	0	22	0	2.017	5.486	41.516	823	1364
Number of Doctorate Degrees, 2008	71	7	1270	0	142.548	3.205	15.785	93093	1294
Academic Staff, 2008	681	323	6571	0	875.363	2.285	9.302	868677	1276
Share of ISCED 6 International Students in Total ISCED 6 Students, 2008	0.108	0.010	1	0	0.161	1.654	5.481	133	1240
Share of 3rd Party Funds in Total Income, 2008	0.263	0.198	1.000	0	0.214	1.358	4.372	263	1000
Share of Tuition Fees in Total Income, 2008	0.193	0.131	1	0	0.211	1.494	5.089	189	979
Age of the Institution, 2008	99	45	920	-1	141.314	2.766	11.141	132192	1334
Share of Academic Staff in Natural Sciences, Engineering and Medical Sciences in Total Academic Staff, 2008	0.218	0.220	1.290	0	0.181	1.168	6.694	179	822
ARWU Top 500, 2008	0.133	0	1	0	0.340	2.156	5.648	182	1364
Regional Population, 2008 (1000)	524	348	7673	27.3	654.188	5.589	44.783	294277	562
Doctoral Degrees Awarded in the Region, 2008	165	54	3030	0	285.838	4.012	25.736	92555	562
Regional Business Services Employment: NACE J, K, M, 2008 (1000)	42	22	981	0.8	79.215	7.522	79.193	10670	257
EPO Patent Applications from the Region, 2008	50	20	980	0.14	96.309	4.978	32.715	24944	496

Source: authors' own construction

[5] At the time of data collection (Spring 2012) it was clear that beginning with 2008 the number of university patents showed a drastic decline for each institution. A well-known technical reason is that considerable time is required by the European Patent Office to examine and decide on all claims they receive. Thus we were not able to follow the widely applied solution in patent studies (i.e., application of at least a two-year lag between the date of patent application and the date of R&D expenditures). Since the spatial pattern of both the inputs of knowledge production (such as R&D) and patenting show a remarkable stability over a time span of about 3 to 5 years (Varga et al. 2005) and many of the low-patenting academic institutes do not submit claims in each year we found our choice of summing up the number of patents over the period of 2006-2008 for each university satisfactorily for our exploratory analysis.

[6] The specific data we use were presented by "Knowledge, Internationalization and Technology Studies" at Bocconi University, Milan, Italy.

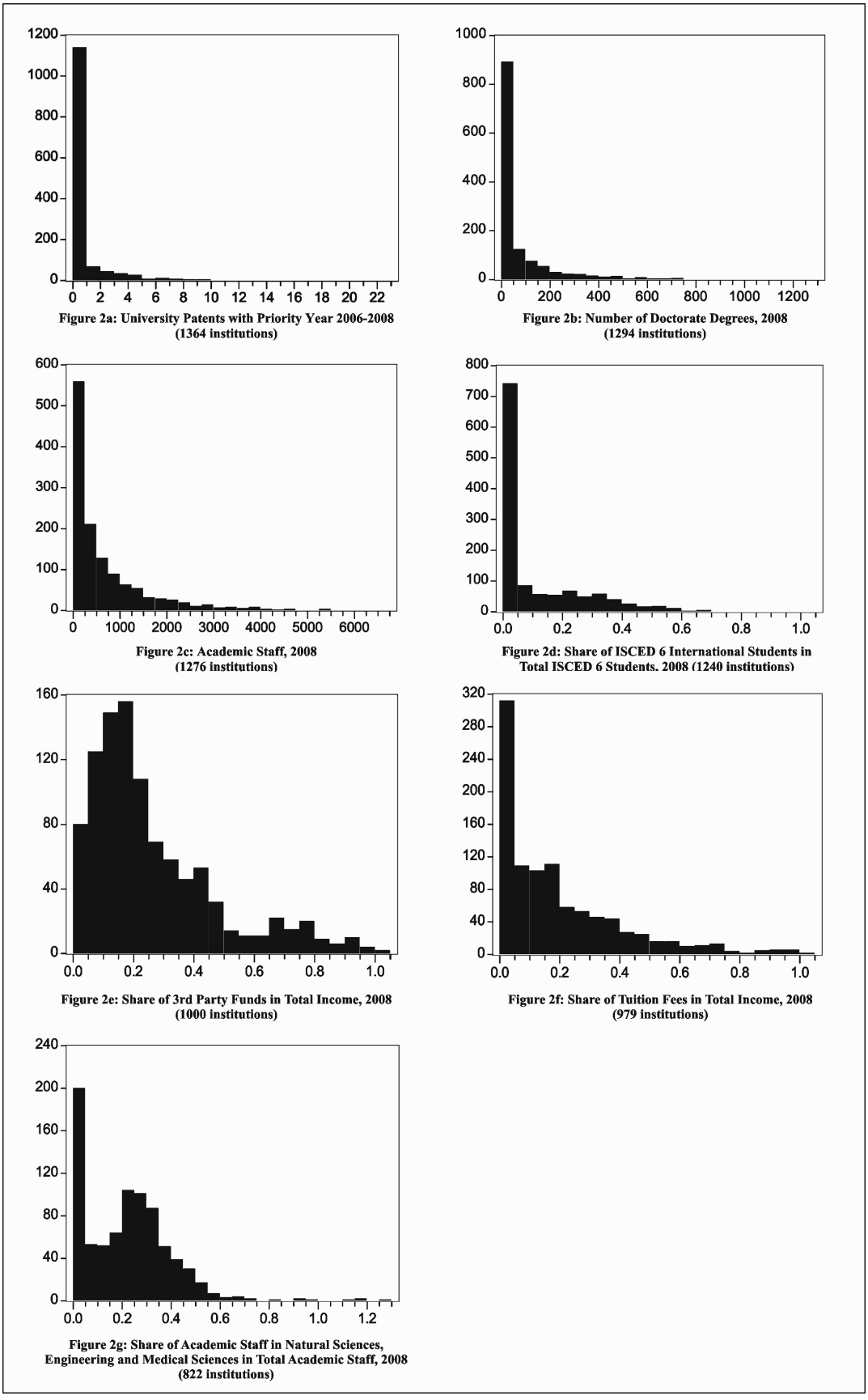
Its distribution is similar to that of university patents: the average value per an institution is 71 and most of the universities exhibit relatively small values while outstanding institutions award several hundred degrees a year. University size represented by academic staff shows a similar distribution. To proxy an institution's international embeddedness we decided to apply the variable Share of ISCED 6 International Students in Total ISCED 6 Students (master and PhD). The ratio of ISCED 6 student in the respective total adds up to 10 percent of total students on average but the distribution around the mean is also highly uneven.

Average share of third party funds (our measure for external funding) and tuition fees (measuring the significance of education) are 26.3 and 19.3 percentages, respectively. However, the distribution of these variables in the sample is more even than those variables described above. Academic staff in natural sciences, engineering and medical sciences is expected to be the most active in university patenting. Interestingly, many of the universities exhibit a value of this variable somewhere around the sample mean. 182 institutions (13.3 %) were ranked in the Top 500 according to the Academic Rankings of World Universities in 2008.

Universities in the extended data set are located in 562 NUTS 3 regions. These regions are quite heterogeneous. The average number of inhabitants is 524 thousand people but the vast majority of them are less populated while the most agglomerated territories measure up to millions of people. There is a high variation in the regionally aggregated number of doctoral degrees awarded in 2008 (our measure for regional university research intensity). Eurostat provides information on employment structure by industries only for 257 regions out of the selected 562. Regional business services employment (the choice for local industry specialization) shows high interregional volatility since its concentration is more intense than that of population. Regional technological output proxied by EPO patent applications in 2008 is also highly concentrated in space with the mean of 50 applications and a standard deviation almost doubling the mean.

Thus both institutional and regional variables are highly concentrated in space with considerable right-side skewness. Therefore for many of the variables most of the observations take relatively low values while a small number of them exhibit outstanding values. Histograms in Figure 2 clearly show that several variables follow a power-law distribution. Number of university patents and doctoral degrees awarded are concentrated most intensely. Less concentrated values characterize variables such as academic staff and the share of ISCED 6 international students. On the other hand the distribution of third party funding, the share of tuition fees in income and scientific specialization of universities are more balanced.

Figure 2 University patents and the main institutional variables: histograms



Source: authors' own construction

Pairwaise correlations of univrsity patents and the selected variables are depicted in Table 3. The table provides correlation statistics both for the full sample and for the sample without the outlier values. Outliers are defined here as observed values exceeding the sample mean with more than two standard deviations.

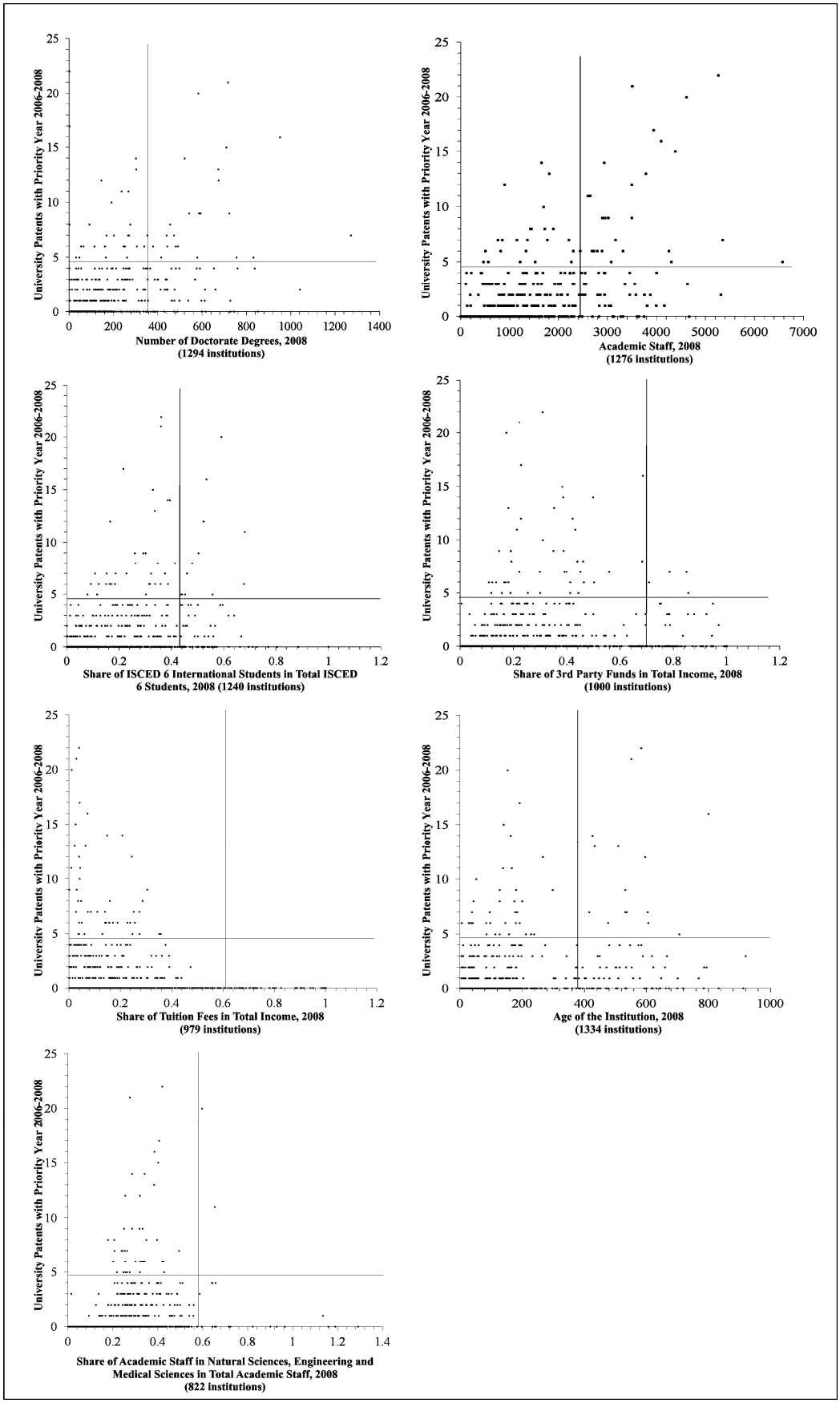
Table 3 Correlations between university patents and variables of university and regional characteristics for all observation and without outliers

Variable name	All observations*	Without outliers**
Academic Staff, 2008	0.578	0.420
Number of Doctoral Degrees, 2008	0.550	0.376
Share of ISCED 6 International Students in Total ISCED 6 Students, 2008	0.369	0.303
Share of 3rd Party Funds in Total Income, 2008	0.114	0.093
Share of Tuition Fees in Total Income, 2008	-0.127	-0.127
Age of the Institution, 2008	0.332	0.194
Share of Academic Staff in Natural Sciences, Engineering and Medical Sciences in Total Academic Staff, 2008	0.237	0.217
ARWU Top 500, 2008	0.525	0.405
Regional Population, 2008 (1000)	0.017	0.000
Doctoral Degrees Awarded in the Region, 2008	0.106	0.060
Regional Business Services Employment: NACE J, K, M, 2008 (1000)	-0.006	-0.023
EPO Patent Applications from the Region, 2008	0.090	0.004

Source: authors' own construction
Note: *All observations available pair wise, **Observations available pair wise without those has higher values than the mean plus two times the standard deviation

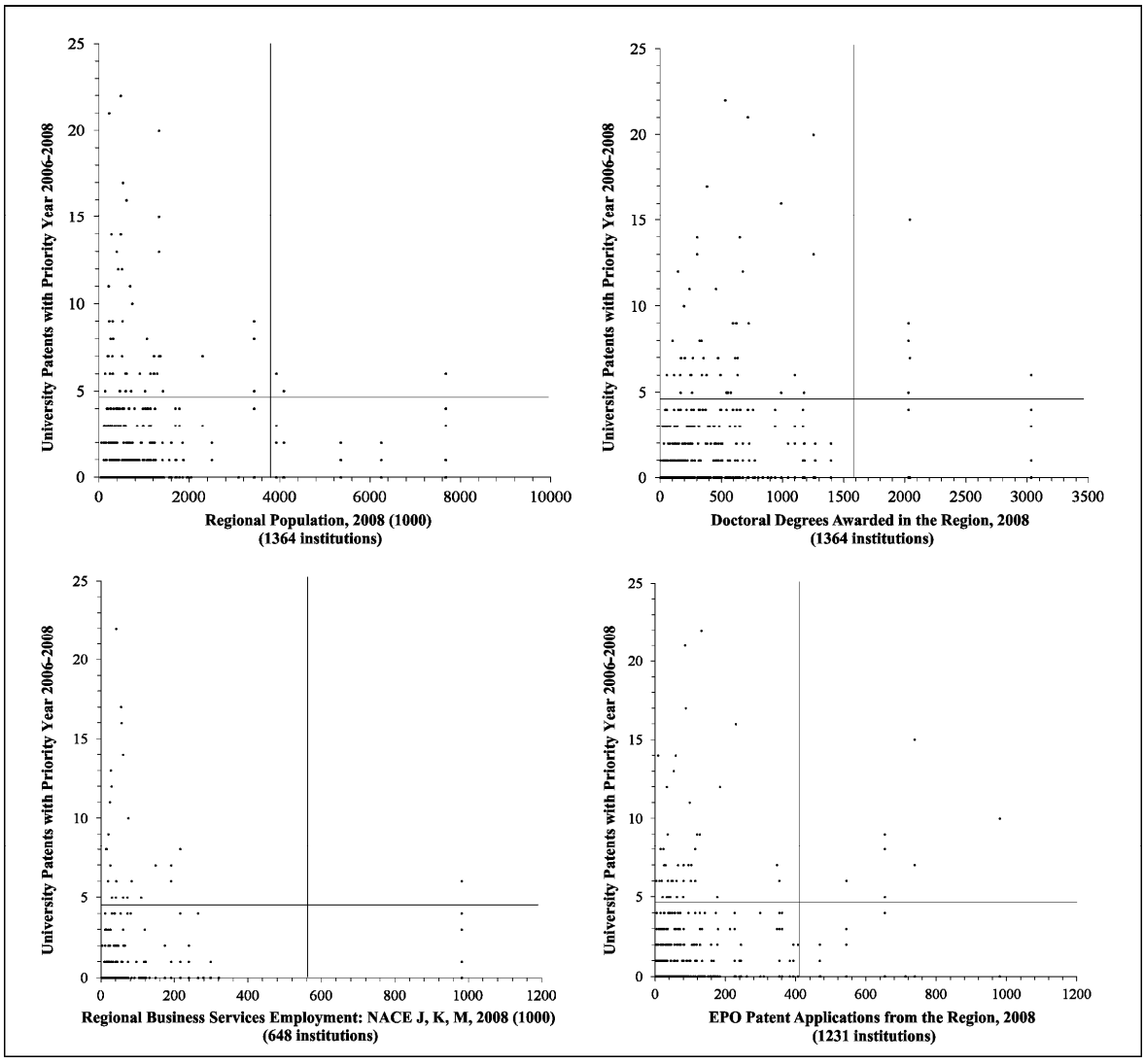
The strongest relations (correlations between 0.5 and 0.6) are found for university size, research activity and university prestige. Scatterplots in Figure 3 and 4 provide series of two-dimensional coordinate systems to depict the values of university patents and institutional or regional characteristics pairwise. The plains are divided by a vertical (institutional or regional characteristics) and a horizontal (university patents) lines standing for the values of the mean plus two standard deviations. Therefore observations above the horizontal line and right from the vertical one are considered as outliers. In each figure the majority of institutions fall into the lower left quadrant. Outliers demonstrate a visible positive impact on patenting which is also represented by the respective correlation values in Table 3.

Figure 3 University patents and the main institutional variables: scatterplots



Source: authors' own construction

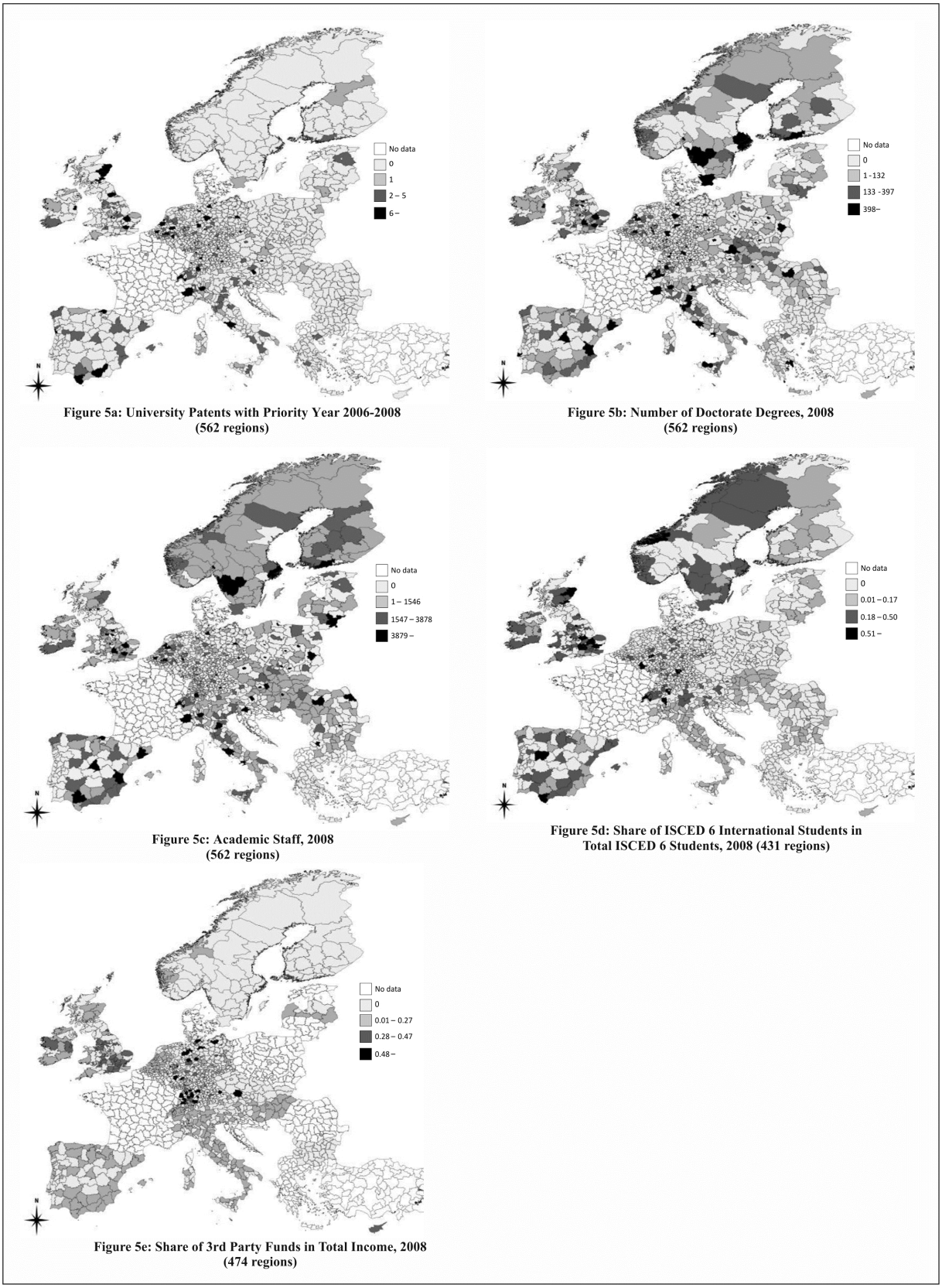
Figure 4 University patents and the main regional variables: scatterplots



Source: authors' own construction

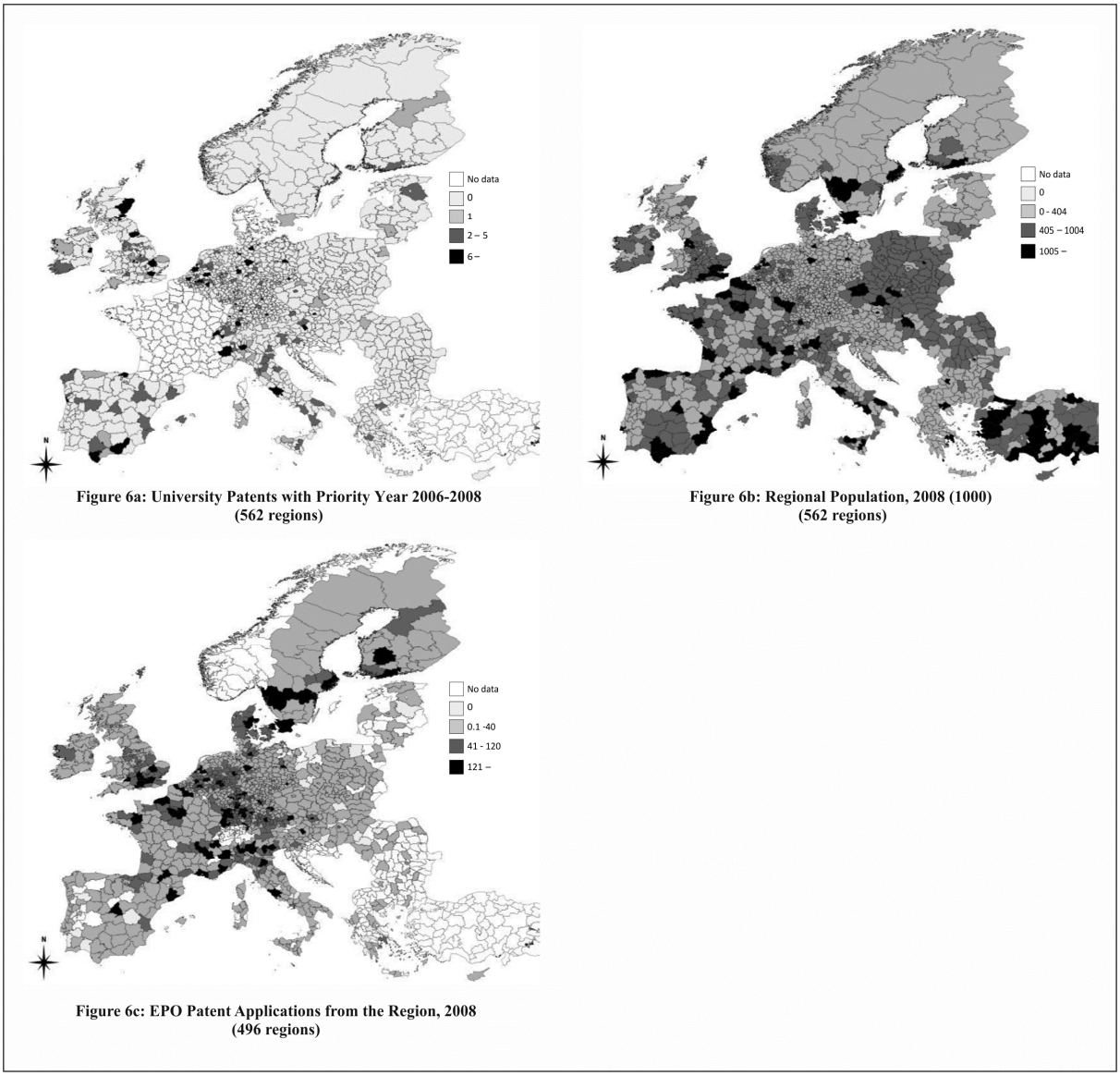
International embeddedness, the age of institutions and scientific specialization are less correlated with patenting and less increased by the inclusion of outliers. The share of third party funds and tuition fees in income seem to be almost ineffective in patenting what possibly reflects that perhaps all universities (and not only the outliers) have to place these resources in their income portfolio. This observation might also suggest that increased market-oriented education might have an adverse impact on research focus. Correlations with regional indicators seem to have no impact on university patenting. However even these correlations seem to increase slightly by the inclusion of high patenting institutions in special regional environments. However, the general picture is that on average there is no observed spatial coincidence between university patenting and regional features.

Figure 5 The spatial distributions of university patents and the main institutional variables (EU NUTS 3 level)



Source: authors' own construction

Figure 6 The spatial distributions of university patents and the main regional variables (EU NUTS 3 level)



Source: authors' own construction

Figures 5 and 6 map the spatial distribution of university patents and institutional/regional factors in Europe. Institutions of the Extended data set are located in 562 NUTS 3 regions but patenting concentrate in 180 regions. However, outstanding patent owner universities (with 5 or more patents) are located only in 53 regions, mainly in Germany and the UK and in some regions in Italy, the Netherlands, Belgium, Switzerland, Spain and Austria, Portugal and Ireland. Most patenting regions are frequently large agglomerations or capital areas. Research activity is more dispersed in space but the highest values are located also in agglomerations. The spatial pattern of academic staff (representing university size) appears similar to that of research intensity. It is quite interesting that values of the variable proxying international

embeddedness are concentrated only in some of the countries (United Kingdom, Switzerland, Scandinavian countries and some Italian, German and Spanish regions).

Reliance on third party funds seems to be mainly a German phenomenon but they also form substantial shares in the incomes of some British, Italian, Swiss, Dutch and Belgian regions too. In Figure 6 regional population follows a pattern close to that of university size and research activity. Regional innovative output (measured by patent applications) seems to be geometrically concentrated around the center of Europe and the most innovative regions are located on the axis between London and Rome, in the Benelux countries, Germany, Northern Italy and in some Spanish and Scandinavian regions. It is very interesting that EPO patent applications and university patents cluster in the same countries and concentrate in the center of Europe but highest value regions in both variables do not coincide.

3. The role of institutional and regional factors in university patenting in Europe

In this section we provide an exploratory-type regression analysis on the role of institutional and regional factors on the probability of university patenting. Tables 4 and 5 depicts binary Probit regression results. Variable selection for the models followed the three-step procedure as described in the previous section. Availability of university characteristics from the EUMIDA extended database and regionalization of EUMIDA data to the NUTS 3 level make these first cut regressions possible. Large number of missing values in the data set and correlations among some of the explanatory variables urge us to follow a very careful step-by-step regression approach to finally distill the model that reflects institutional-regional interrelations in the most reliable manner.

Models in Table 4 focus on institutional-level factors in university patenting. Research activity is certainly the most relevant input in university patenting. We experimented with two measures of research intensity that is R&D expenditures and number of doctoral degrees awarded by the institution. The drawback of the R&D data (questionable representativeness resulting from frequently missing values) has already been demonstrated in the previous section. In Table 6 it became clear that the size measure (academic staff) and R&D expenditures are highly correlated. Thus small number of observations and potential multicollinearity advice us to drop the R&D expenditures variable from the model. The other proxy for research intensity, number of doctorate degrees awarded also correlates with academic staff and as shown in Model 5 even with the share of ISCED 6 international students' share. Loosing significance and the strong drop in parameter value suggest the

presence of multicollinearity in Model 5. Due to correlations from Model 6 we consider the number of academic staff as a proxy for both institution size and research intensity. Share of ISCED 6 students and share of third party funds are variables to be selected after a longer procedure of trials of alternative measures of international embeddedness and external fudning.

Models 7 to 11 in Table 4 show that research intensity and size (measured by academic staff), international embeddedness and third party funding are positively associated with the probability of university patenting. The models also suggest that institutions focusing more intensely on education are most probably not productive in patenting and that patenting probability is not affected by the age of a university. However, specialization of academic staff in natural science, engineering and medical fields increase patenting probability such that the general quality of an institution. The last two models in Table 4 show similar behavior. However, Model 11 in Table 4 (Model 1 in Table 5) is selected as a base for regional extension in Table 5 because of its significantly larger institutional coverage (893 vs. 760)[7].
Table 5 presents the results of the Probit regressions when regional variables are also included in the model. The literature is somewhat ambiguous as to the impact of agglomeration on academic entrepreneurship. However, the impact of regional factors on university patenting (a special form of academic entrepreneurship) has not been studied much in the literature. So our findings based on a large data set covering many of the European institutes certainly bring important information to this specific field of study. Descriptive analyses in the previous section indicate that the regional impact on university patenting will most probably be very limited. Regression results in Table 5 indicate that regional size, concentration of public research, agglomeration of regional business services and regional technological output are all negatively associated with the probability of university patenting. The strong negative effects are certainly surprising results. This finding is strongly reinforced by Model 6 in Table 5 where a summary measure of the development of the regional innovation system (a dummy for high innovation regions) is included in the regression. Model 8 presents the marginal effects in the final regression (Model 6). As suggested increasing international embeddedness and external funding have some important potentials for universities to expand their patenting activities.

[7] Note that the regional extension was carried out with the base of Model 10 as well and the findings are essentially the same as the ones shown in Table 5. (Regression results are available upon request.)

Table 4 Binary Probit ML Estimation Results:
The Role of Institutional Factors in European University Patenting[a]

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Constant	-0.8270*** (0.0684)[b]	-1.7433*** (0.1172)	-1.5481*** (0.0603)	-18450*** (0.0799)	-2.2568*** (0.1103)	-2.3117*** (0.1056)	-2.3713*** (0.1404)	-2.3528*** (0.1694)	-2.3724*** (0.1435)	-2.5924*** (0.1818)	-2.2963*** (0.1437)
R&D expenditures, 2008	4.96E-09*** (1.12E-09)	-2.79E-09* (1.59E-09)									
Number of Doctoral Degrees, 2008			0.0061*** (0.0004)	0.0022*** (0.0006)	0.0007 (0.0007)						
Academic Staff, 2008		0.0011*** (0.0001)		0.0008*** (0.0001)	0.0009*** (0.0001)	0.0010*** (6.62E-05)	0.0010*** (7.31E-05)	0.0010*** (7.84E-05)	0.0010*** (8.34E-05)	0.0009*** (7.74E-05)	0.0009*** (9.23E-05)
Share of ISCED 6 International Students in Total ISCED 6 Students, 2008[c]					2.6709*** (0.3132)	2.8421*** (0.3026)	2.1896*** (0.3304)	2.1675*** (0.3434)	2.1783*** (0.3334)	2.0586*** (0.3506)	2.0717*** (0.3362)
Share of 3rd Party Funds in Total Income, 2008[d]							0.7609*** (0.2715)	0.8069*** (0.2775)	0.7584*** (0.2731)	0.5437* (0.2856)	0.6533** (0.2778)
Share of Tuition Fees in Total Income								-0.2301 (0.4105)			
Age of the Institution, 2008									4.09E-05 (0.0004)		
Share of Academic Staff in Natural Sciences, Engineering and Medical Sciences in Total Academic Staff, 2008										1.6835*** (0.3917)	
ARWU Top 500, 2008											0.3569** (0.1784)
McFadden R-squared	0.05	0.29	0.32	0.37	0.43	0.43	0.43	0.44	0.43	0.44	0.43
Number of observations	535	496	1294	1225	1139	1187	893	892	872	760	893

Source: authors' own construction

a. The dependent variable takes 1 if at least 1 patent is assigned to the university in 2006-2008.
b. Estimated standard errors are in parentheses; *** indicates significance at $p < 0.01$; ** indicates significance at $p < 0.05$; * indicates $p < 0.1$.
c. This variable was selected as a result of systematic regression runs accounting for the impact of international embededdness by different indicators (see Table A1) in the same econometric model (Model 5).
d. This variable was selected as a result of systematic regression runs accounting for the impact of external connectivity by different indicators (see Table A1) in the same econometric model (Model 7).

Table 5 Binary Probit ML Estimation Results:
The Role of Institutional and Regional Factors in European University Patenting[a]

Model	(1)*	(2)	(3)	(4)	(5)	(6)	(7)	(8) Marginal Effects in Model (6)
Constant	-2.2963***	-2.2484***	-2.2567***	-2.2351***	-2.1420***	-2.2409***	-2.0193***	-0.4632***
	(0.1437)[b]	(0.1460)	(0.1449)	(0.2698)	(0.1598)	(0.1493)	(0.3255)	(0.1493)
Academic Staff, 2008	0.0009***	0.0009***	0.0009***	0.0006***	0.0009***	0.0009***	0.0006***	0.0002***
	(9.23E-05)	(9.30E-05)	(9.29E-05)	(0.0002)	(9.73E-05)	(9.31E-05)	(0.0002)	(9.31E-05)
Share of ISCED 6 International Students in Total ISCED 6 Students, 2008[c]	2.0717***	2.2236***	2.2843***	3.2235***	2.0125***	2.0988***	3.4499***	0.4338***
	(0.3362)	(0.3491)	(0.3534)	(0.6066)	(0.3552)	(0.3512)	(0.7126)	(0.3512)
Share of 3rd Party Funds in Total Income, 2008	0.6533**	0.6027**	0.6482**	-0.3113	0.6068**	0.8479***	0.0293	0.1753***
	(0.2778)	(0.2801)	(0.2799)	(0.9514)	(0.2938)	(0.2874)	(0.9790)	(0.2874)
ARWU Top 500, 2008	0.3569**	0.3376*	0.3481*	0.5516*	0.3071	0.4164**	0.7649**	0.0861**
	(0.1784)	(0.1791)	(0.1788)	(0.3151)	(0.1901)	(0.1839)	(0.3870)	(0.1839)
Regional Population, 2008		-6.05E-05*					-0.0003	
		(3.55E-05)					(0.0004)	
Doctoral Degrees Awarded in the Region[c], 2008			-0.0002**				-0.0007	
			(9.58E-05)				(0.0007)	
Regional Business Services Employment: NACE J, K, M[d], 2008				-0.0006*			0.0036	
				(0.0003)			(0.0032)	
EPO Patentt Applications from the Region, 2008					-0.0010*		-0.0022	
					(0.0006)		(0.0016)	
High Innovation Region[e], 2006						-0.4818***	-1.2524***	-0.0996***
						(0.1629)	(0.3572)	(0.1629)
McFadden R-squared	0.43	0.44	0.44	0.39	0.41	0.44	0.42	0.44
Number of observations	893	893	893	336	810	862	299	862

Source: authors' own construction

a. The dependent variable takes 1 if at least 1 patent is assigned to the university in 2006-2008.
b. Estimated standard errors are in parentheses; *** indicates significance at $p < 0.01$; ** indicates significance at $p < 0.05$; * indicates $p < 0.1$.
c. Regional sum without counting the value of the respective institution.
d. J: Information and communication; K: Finance and insurance; M: Professional, scientific and technical activities, administrative and support services.
e. Dummy variable: it takes the value of 1 if the region is specified as „High innovation region" in the European Regional Innovation Scoreboard (Hollanders et al. 2009).
* The last two models in Table 4 show similar behavior. However, Model 11 in Table 4 (Model 1 in Table 5) is selected as a base for regional extension because of its significantly larger institutional coverage (893 vs. 760). Note that the regional extension was carried out with the base of Model 10 as well and the findings are essentially the same as the ones shown in Table 5. (Regression results are available upon request.)

4. Conclusion

In this paper we carried out a first cut spatial exploratory study on EUMIDA data with a large coverage of European research oriented universities (about two-third of research active universities are included even in the final regression sample). An important additional novelty of our study is that NUTS3 level aggregation of data is applied contrary to the usually utilized NUTS 2 information.

Most of the institutional factors (university size, research intensity, external funding, international embeddedness and university quality) stand in a positive association with university patenting. This reinforces previous findings in the literature by studies usually operating with significantly less coverage of higher education institutions.

The most surprising results are related to the role of regional factors in university patenting. Our final results suggest that the role of those regional factors that are usually found important for university technology transfer (regional size, concentration of public research, agglomeration of regional business services, regional technological output and the development of the regional innovation system) are all negatively associated with the probability of university patenting. These results suggest that the regional innovation environment is not only marginally important for university patenting (which have already been suspected by some studies in the literature) but its impact is even negative: universities located in regions with less developed innovation systems seem to have a higher chance to patent than otherwise. This is an important and new observation.

The negligible role of regional factors in university patenting in our study resembles very much to findings on publication behavior where the agglomeration of regional innovation factors' impact is not observed either (Varga, Pontikakis, Chorafakis 2013, Sebestyén, Varga 2013). Thus it seems that university patenting is driven by institutional and regional factors similar to those that drive publication behavior. It is a somewhat strange result considering an activity (patenting) that is supposed to be related to the industrial world. However, this result might be related to findings of those studies where limited industrial relevance of a significant share of university patents is suggested.

There are several constraints of this study. The first one is that only the impacts on the probability of patenting are studied with no distinction being made with respect to the intensity of patenting. This choice ruled out the possibility to examine more closely those institutions that seem to be outliers in many respects. When we made the decision to focus on the presence of patents but not on their quality we might also ruled out to study some of the

potentially important differences among higher quality university patent producing institutions and the other institutions developing only medium or low quality patents. Considering the aspects of quality might put the impact of the regional innovation environment in a different perspective as well. We leave these research possibilities open for further attempts.

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Appendix 1 The set of potential institutional variables

Regional characteristic	Proxy variable	Data source	Probit model with one explanatory variable. Dependent variable: Binary (it equals 1 if the institution owns any patent with priority year 2006, 2007 or 2008 and 0 otherwise)			
			Parameter sign	Parameter significance at p < 0.1	McFadden R-squared	Observation number
RESEARCH INTENSITY	Number of Doctoral Degrees, 2008	EUMIDA (Extended)	+	S	0.31	1294
	R&D Expenditures in EUR, 2008	EUMIDA (Extended)	+	S	0.04	535
SIZE OF THE INSTITUTION	Total Staff, 2008	EUMIDA (Extended)	+	S	0.33	1227
	Academic Staff, 2008	EUMIDA (Extended)	+	S	0.35	1276
	Total Students ISCED 5, 2008	EUMIDA (Extended)	+	S	0.12	1349
	Total Students ISCED 6, 2008	EUMIDA (Extended)	+	S	0.23	1347
	Total Expenditures in EUR, 2008	EUMIDA (Extended)	+	S	0.12	1059
	Core Funding in EUR, 2008	EUMIDA (Extended)	+	not	0.00	699
INTERNATIONAL EMBEDDEDNESS	Foreign Academic Staff, 2008	EUMIDA (Extended)	+	S	0.10	647
	Share of ISCED 6 International Students in Total ISCED 6 Students, 2008	calculated	+	S	0.07	769
	Share of International Degrees (Doctorate) in Total Degrees (Doctorate) , 2008	calculated	+	S	0.03	533
EXTERNAL FUNDING	R&D Funding Private Sector in EUR, 2008	EUMIDA (Extended)	+	S	0.03	841
	Share of R&D Funding Private Sector in Total Income, 2008	calculated	-	not	0.00	449
	3rd Party Funding in EUR, 2008	EUMIDA (Extended)	+	not	NA	1001
	Share of 3rd Party Funds in Total Income, 2008	calculated	+	S	0.01	1000
EDUCATION SIGNIFICANCE	Share of Tuition Fees in Total Income, 2008	calculated	-	S	0.01	979
AGE OF THE INSTITUTION	Age of the Institution in 2008	EUMIDA (Core)	+	S	0.11	1334
SCIENTIFIC SPECIALIZATION	Share of Staff in Natural Science, 2008s	calculated	+	S	0.15	822
	Share of Staff in Engineering Technology, 2008	calculated	+	not	0.00	822
	Share of Staff in Medical Sciences, 2008	calculated	+	S	0.02	822
	Share of Academic Staff in Natural Sciences, Engineering and Medical Sciences in Total Academic Staff, 2008	calculated	+	S	0.09	822
UNIVERSITY PRESTIGE	ARWU Top 100, 2008	Academic Rankings of World Universities	+	S	0.04	1364
	ARWU Top 500, 2008	Academic Rankings of World Universities*	+	S	0.28	1364

Source: own construction
Note: *ARWU (2008)

Appendix 2 The set of potential regional variables

Regional characteristic	Proxy variable	Data source	Probit model with one explanatory variable			
			Dependent variable: Binary (it equals 1 if the institution owns any patent with priority year 2006, 2007 or 2008 and 0 otherwise)			
			Parameter sign	Parameter significance at p < 0.1	McFadden R-squared	Observation number
REGIONAL SIZE	Regional Population - Annual Average Population in the Region, 2008 (1000)	Eurostat	+	S	0.00	1364
	Employment 2008 - Total - All NACE Activities (1000)	Eurostat	+	not	0.00	1159
	GDP at Current Market Prices 2008 (Millions of PPS)	Eurostat	+	not	0.00	1128
REGIONAL UNIVERSITY RESEARCH INTENSITY	Doctoral Degrees Awarded in the Region, 2008	EUMIDA (Core) - aggregated to NUTS 3 level	+	S	0.00	1364
INDUSTRIAL SPECIALIZATION	Employment 2008 - Agriculture, Forestry and Fishing	Eurostat	+	S	0.01	746
	Employment 2008 - Industry (except Construction)	Eurostat	+	not	0.00	764
	Employment 2008 - Manufacturing	Eurostat	+	not	0.00	763
	Employment 2008 – Construction	Eurostat	+	S	0.00	764
	Employment 2008 - Wholesale and Retail Trade, Transport, Accommodation and Food Service Activities	Eurostat	+	S	0.00	695
	Employment 2008 - Information and Communication	Eurostat	+	not	0.00	648
	Employment 2008 - Financial and Insurance Activities	Eurostat	+	S	0.01	695
	Employment 2008 - Real estate Activities	Eurostat	+	not	0.00	648
	Employment 2008 - Professional, Scientific and Technical Activities; Administrative and Support Service Activities	Eurostat	+	not	0.00	648
	Employment 2008 – Regional Business Services (Information and Communication; Financial and Insurance Activities; Professional, Scientific and Technical Activities; Administrative and Support Service Activities)	calculated	+	not	0.00	648
	Employment 2008 - Public Administration, Defence, Education, Human Health and Social Work Activities	Eurostat	+	S	0.00	695
	Employment 2008 - Arts, Entertainment and Recreation; Other Service Activities; Activities of Household and Extra-Territorial Organizations and Bodies	Eurostat	+	not	0.00	648
REGIONAL INNOVATION	EPO Patent Applications from the Region, 2008	Eurostat	-	S	0.01	1231
	High Innovation Region, 2006	European Regional Innovation Scoreboard*	-	not	0.00	1328

Source: own construction
Note: *Hollanders et al. (2009)

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12. Regional Entrepreneurship in Hungary Based on the Regional Entrepreneurship and Development Index (REDI) Methodology

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This paper presents a regional application of the Global Entrepreneurship and Development Index (GEDI) methodology of Acs and his co-authors (2013) to examine the level of entrepreneurship across Hungary's seven NUTS-2 level regions. The Regional Entrepreneurship and Development Index (REDI) has been constructed for capturing the contextual features of entrepreneurship across regions. The REDI method builds on a Systems of Entrepreneurship Theory and provides a way to profile Regional Systems of Entrepreneurship. Important aspects of the REDI method including the Penalty for Bottleneck analysis, which helps identify constraining factors in Regional Systems of Entrepreneurship, and Policy Portfolio Optimization analysis, which helps policy-makers consider trade-offs between alternative policy scenarios and associated allocations of policy resources. The paper portrays the entrepreneurial disparities amongst Hungarian regions and provides public policy suggestions to improve the level of entrepreneurship and optimize resource allocation over the 14 pillars of entrepreneurship in the seven Hungarian regions.

Keywords: Entrepreneurship, Regional Development, Entrepreneurship policy, Hungary

1. Introduction

Entrepreneurship as a major driver for economic development, growth, competitiveness, employment, productivity and innovation has been gaining increasing importance over the last thirty some years. (Acs 2008, Acs et al. 2008, Carree – Thurik 2003, Braunerhjelm et al. 2009). However, the extent and the magnitude of its influence varies across countries and regions (Acs 2010, Audretsch – Fritsch 2002, Fritsch – Schmude 2006). The reasons behind that is start-up rates as well as post-entry firm performances are influenced by contextual institutional and regulatory features, input and product market structures and the quality of human capital. Furthermore, agglomeration factors such as clustering, proximity to vital infrastructures, connectivity to major markets shape further the entrepreneurial climate and innovation milieu of the regions (Audretsch – Feldman 1996, Boschma – Lambooy 1999, Andersson et al. 2005). The start-up rate of new businesses forms the industry composition and, hence, influences regional growth and contributes to regional disparities (Feldman – Audretsch 1999, Feldman 2001, Audrestch – Fritsch 2002, Acs – Varga 2005, Fritsch – Mueller 2004).

[1] The research results underlying this study have been supported by the MTA-PTE Innovation and Economic Growth Research Group project.

Interestingly, even entrepreneurship has gained quick and ardent acceptance from practitioners in the policy agenda, since its appearance, entrepreneurship policy as quasi-independent field apart from public and small business policy has been emerging just recently (Lundström – Stevenson 2005). This policy evolution was mainly constrained and influenced by the availability of data[2]. Although the role of entrepreneurship in economic development is gradually becoming clearer, the understanding of policies to harness the potential of entrepreneurship remains underdeveloped. This controversy is largely explained by the discrepancy between the definition and the measure of entrepreneurship. While the complex and multidimensional nature of entrepreneurship is widely accepted (Wennekers – Thurik 1999) major measures of entrepreneurship are still one-dimensional (Iversen et al. 2008). The most frequently used start-up, ownership and business density rates are problematic because they do not differentiate between the quality and the quantity aspects of entrepreneurship (Acs – Szerb 2012, Shane 2009). Therefore, the latest theoretical findings imply deviating from simple entrepreneurship measures to more complex indicators and indices that relate positively to economic development. Moreover, single measures also miss to identify the effect of national and contextual factors that could also very different according to the stages of economic development (OECD 2007).

The Global Entrepreneurship and Development Index (GEDI) project came to alive to provide a suitable measure of entrepreneurship based on the multidimensional definition of entrepreneurship and to present a useful platform for policy analysis and outreach. The distinguished features of GEDI are (1) the contextualization of individual-level data by a country's institutional conditions; (2) the use of 14 context-weighted measures of entrepreneurial Attitudes, Abilities and Aspirations; (3) the recognition that different pillars combine to produce system-level performance; and (4) the consequent recognition that national entrepreneurial performance may be held back by *bottleneck factors* - i.e. poorly performing pillars that may constrain system performance (Acs et al. 2013).

The first attempt to adapt the GEDI methodology to measure regional entrepreneurship, the *Regional Entrepreneurship and Development Index (REDI)* has been constructed for capturing the contextual features of entrepreneurship across NUTS-2 level Spanish regions

[2] Following earlier initiatives such as the Observatory of European SMEs, consistent data collection about new firm formation just started less than 15 years ago. One of the pioneers was the Global Entrepreneurship Monitor launched in 1998 (Reynolds et al. 2005). A measure of the regulatory and institutional framework of new firms is the World Bank's Ease of Doing Business index. In the mid-2000s, OECD launched an entrepreneurship measure program based on a comprehensive, multidimensional definition of entrepreneurship (Hoffman et al. 2006).

(Acs et al. 2012). In the present paper, we provide a further development of the GEDI and REDI methodologies and their application for measuring regional level entrepreneurship in seven NUTS-2 level Hungarian regions. As a result of the original GEDI methodology improvement, the amended technique makes possible to balance out and optimize the resource allocation of the 14 pillars of entrepreneurship. Similar to the Spanish regional analysis, this version is also capable to offer tailor-made policy suggestions for the seven Hungarian regions by identifying the weaknesses of the regional entrepreneurial climate and individual factors.

The structure of the paper is the following: the next section of the paper is about the regional adaption of the GEDI methodology including the new development. In section three, this is followed by the results of the analysis and policy discussion. Finally in section four, the paper concludes with a summary.

2. The Global Entrepreneurship and Development Index (GEDI)

GEDI views entrepreneurship as part of a National System of Entrepreneurship (Acs et al. 2013). As such entrepreneurship occurs in response to the dynamic, institutionally embedded interaction between entrepreneurial attitudes, abilities, and aspirations, by individuals, which drives the allocation of resources through the creation and operation of new ventures.

GEDI is based on twenty-eight variables which make up fourteen pillars further divided into three sub-indices: *attitudes* (ATT), *abilities* (ABT) and *aspiration* (ASP). The abilities and aspiration sub-indices capture actual entrepreneurship activities as they relate to nascent and start-up businesses, while the entrepreneurial attitude (ATT) sub-index identifies the attitudes of a country's population as they relate to entrepreneurship. Each of the fourteen pillars contains an individual and institutional variable[3] The GEDI index also applies the novel Penalty for Bottleneck (PFB) methodology which facilitates the identification of bottlenecks relevant for policy development[4].

3. The Penalty for Bottleneck

We have defined entrepreneurship as the *dynamic* interaction of entrepreneurial attitudes, abilities, and aspirations and developed the Penalty for Bottleneck (PFB)

[3] See Appendix 1, 2 and 3 for the complete GEDI framework.
[4] For the description of the full methodology see Acs and Szerb (2011).

methodology[5] for measuring and quantifying these interactions (Acs et al. 2013). Bottleneck is defined as the worst performing weakest link, or binding constraint in the system. With respect to entrepreneurship, by "bottleneck" we mean a shortage or the lowest level of a particular entrepreneurial indicator as compared to other indicators of the sub-index. This notion of bottleneck is important for policy purposes. Our model suggests that attitudes, ability and aspiration interact; if they are out of balance, entrepreneurship is inhibited.

The sub-indices are composed of four or five components, defined as indicators that should be adjusted in a way that takes this notion of balance into account. After normalizing the scores of all the indicators, the value of each indicator of a sub-index in a country is penalized by linking it to the score of the indicator with the weakest performance in that country. This simulates the notion of a bottleneck; if the weakest indicator were improved, the particular sub-index and ultimately the whole GEDI would show a significant improvement. Moreover, the penalty should be higher if differences are higher. Looking from either the configuration or the weakest link perspective it implies that stable and efficient sub-index configurations are those that are balanced (have about the same level) in all indicators.

Mathematically, we model the penalty for bottlenecks by modifying Casado-Tarabusi and Palazzi (2004) original function for our purposes. The penalty function is defined as:

$$h_{i,j} = y_{min} + (1 - e^{-(y_{i,j} - y_{min})}) \quad (1)$$

where $h_{i,j}$ is the modified, post-penalty value of index component j in country i

$y_{i,j}$ is the normalized value of index component j in country i

y_{min} is the lowest value of $y_{i,j}$ for country i.

i = 1, 2,……m = the number of countries

j= 1, 2,…….n = the number of index components

We suggest that this dynamic index construction is particularly useful for enhancing entrepreneurship in a particular country. There are two potential drawbacks of the PFB method. One is the arbitrary selection of the magnitude of the penalty. The other problem is that we cannot exclude fully the potential that a particularly good feature can have a positive effect on the weaker performing features. While this could also happen, most of the entrepreneurship policy experts hold that policy should focus on improving the weakest link in the system. Altogether, we claim that the PFB methodology is theoretically better than the

[5] This methodological section is based on Acs and Szerb (2011, 2012).

arithmetic average calculation. However, the PFB adjusted GEDI is not necessary an optimal solution since the magnitude of the penalty is unknown.

4. The regional adaptation of the Global Entrepreneurship and Development Index

In order to use the GEDI index for a regional analysis, the data and variable used must be adapted to reflect regional conditions. The first attempt for such an adaption has been done by Acs and his co-authors (2012) using regional data for Spain. In this paper, we follow Acs and his co-authors (2012) for the creation of the 14 pillars but use an amended version of the GEDI methodology that adjusts the individual pillar averages before penalizing then.

The main concern for the individual variables used is the availability of a representative sample size for each of the seven Hungarian regions[6]. However, the adaption of institutional variables for regional analyses is more complicated. Ideally, we would use the same variables for the regional analyses as we do for the country level analysis. Unfortunately, most institutional variables are not available for specific regions. Several options exist to overcome this limitation. One possible solution is to use closely correlated regional proxies to substitute for a missing variable. Another possible solution is to simply use the same country level institutional variables for all regions. In these cases where this method is used, the pillar level value would correspond entirely to the variations in the individual level variable used. Though the institutional variance would be missing, it is likely that the variance of the institutional variables within a country is much lower than the variance between countries. In light of the lack of regional institutional level data for five GEDI pillars, we applied a mixed method, incorporating all three alternative approaches[7]. The idea behind the regional entrepreneurship index construction is to find regional level institutional data that are available also in the country level. If the regional institutional data are lacking then country level institutional data can be applied. Out of the 14 institutional variables, we apply for the entrepreneurship index construction 9 variables which are available in the NUTS-2 regional levels[8]. As a consequence, real Hungarian regional differences may be higher than our

[6] While it was not a problem for Spain that had a regionally representative sample, we had to use a pooled data set of the GEM 2008-2012 Adult Population Survey reaching a sample of 10 000, in total. For a detailed discussion regarding the methodology used for GEDI country analyses see Acs et al. (2012).

[7] The detailed description of all of the variables and sources can be found in Appendix 1 and Appendix 2.

[8] Over the last decades, it has been an increasing movement in the European Union to collect institutional variables not only at the country, but also at the regional levels (NUTS-1, NUTS-2 and NUTS-3). This increasing data collection activity provides a unique opportunity to construct an entrepreneurship index similar to the national GEDI. See the Eurostat regional database: http://epp.eurostat.ec.europa.eu

analysis shows. The overall regional level entrepreneurship and development index for the Hungarian regions are calculated as benchmarking the country level pillars. While this combined methodology makes possible to contrast the entrepreneurial performance of the Hungarian regions to other countries, it is more appropriate to compare the regions to one another. For calculating the country and the regional level index values the following steps are applied.

First, after handling the outliers we normalize the pillar values:

$$x_{i,j} = \frac{z_{i,j}}{\max_i z_{i,j}} \qquad (2)$$

for all j= 1,..m the number of pillars

where $x_{i,j}$ is the normalized score value for country or region i and pillar j

$z_{i,j}$ is the original pillar value for country and region i and pillar j

$\max_i z_{i,j}$ is the maximum value for pillar j

Let's calculate the average of each of the 14 pillars as

$$\bar{x}_j = \frac{\sum_{i=1}^{n} x_{i,j}}{n} \qquad \text{for all } j \qquad (3)$$

where x_i is the normalized score for country or region *i* for a particular pillar.

$\bar{x}_j$ is the arithmetic average of the pillar for number *n* countries and regions

The average of the 14 pillars average is the following:

$$\bar{y} = \frac{\sum_{j=1}^{k} \bar{x}_j}{m} \qquad (4)$$

We want to transform the x_i values in such a way to preserve that the minimum value is 0 and the maximum value is 1 and the average of the transformed value $\bar{y}$ ($0 < y_i \leq 1$).

The task can be divided into two non-trivial parts as:

(a) $\bar{x} < \bar{y}$

(b) $\bar{x} > \bar{y}$

In case (a) the average is higher and incase (b) the average is lower than the original pillar averages. If $\bar{x}_j = \bar{y}$ then the solution is trivial.

(a) case: $\bar{x} < \bar{y}$

$$y_i = 1 - (1 - x_i)\frac{1 - \bar{y}}{1 - \bar{x}} \quad (5)$$

(b) case: $\bar{x} > \bar{y}$

$$y_i = \begin{cases} 1 & if\ x_i = 1 \\ x_i \frac{\bar{y} - k/n}{\bar{x} - k/n} & otherwise \end{cases} \quad (6)$$

where k is the number of units having originally the value 1. After the transformation y_i cannot be smaller than k/n.

5. Hungary's regions compared at the GEDI aggregate level

The relative rankings of Hungary's seven regions based on their aggregate GEDI scores as compared to 83 other countries are shown in Table 1. The regional scores are quite heterogeneous, while the scores and rankings for them range from at the high end, 47.7 for Central Hungary which is ranked in 31st place to 36.1 at the low end for Southern Great Plain which is ranked in 63rd place. In terms of country comparisons, Central Hungary's score ranks it at a level similar to Latvia and Turkey, while Southern Great Plain's ranking is similar to Dominican Republic and Panama.

We can state that the GEDI rankings of the regions reflect roughly their well-known ranking relating to regional disparities. Only the position of Central Transdanubia deviates from the expected position. In terms of GDP per capita Central Transdanubia possess a better position, usually being placed directly after Western Transdanubia.

Table 1 The GEDI 2006-2011 ranking: Countries and Hungary's regions compared

Rank	Country/Region	Per capita GDP (PPP)	GEDI	Rank	Country/Region	Per capita GDP (PPP)	GEDI
1	United States	47 184	78.7	47	Greece	28 154	42.1
2	Denmark	39 558	76.4	48	Barbados	19 252	41.3
3	Sweden	38 947	75.2	**49**	**Hungary 2008-2012**		**41.2**
4	Australia	39 407	74.6	50	Western Transdanubia	18 775	39.8
5	Netherlands	42 475	73.2	51	South Africa	10 486	39.5
6	Canada	38 915	70.3	52	Macedonia	11 072	39.4
7	United Kingdom	35 860	68.6	53	Northern Hungary	12 246	39.3
8	Iceland	34 949	68.3	54	Southern Transdanubia	13 856	39.2
9	Norway	56 894	67.9	55	Mexico	14 566	39.0
10	Switzerland	46 215	66.9	56	Tunisia	8 524	38.1
11	France	33 820	66.8	57	Argentina	15 893	38.0
12	Taiwan	37 931	66.1	58	Central Transdanubia	16 726	37.0
13	Puerto Rico	16 300	65.0	59	China	7 536	37.0
14	Finland	36 660	63.1	60	Jordan	5 706	36.5
15	Belgium	37 448	62.8	61	Northern Great Plain	13 036	36.3
16	Germany	37 591	62.3	62	Dominican Republic	9 280	36.1
17	Austria	39 698	61.7	63	Southern Great Plain	13 307	36.1
18	Chile	15 044	61.7	64	Panama	13 877	34.9
19	Singapore	57 505	61.4	65	Thailand	8 490	33.8
20	Ireland	39 727	61.2	66	Trinidad and Tobago	25 539	33.0
21	Israel	28 546	59.2	67	Jamaica	7 839	32.8
22	United Arab Emirates	38 089	55.9	68	Russia	19 840	32.7
23	Slovenia	27 556	53.0	69	Kazakhstan	12 050	32.2
24	Poland	19 747	51.7	70	Serbia	11 488	32.1
25	Saudi Arabia	22 545	51.5	71	Nigeria	2 363	32.0
26	Czech	25 299	49.8	72	Syria	5 248	31.5
27	**Hungary 2011**	**20 307**	**49.7**	73	Brazil	11 127	31.3
28	Spain	32 070	49.1	74	Indonesia	4 293	31.2
29	Lithuania	18 184	48.6	75	Bosnia and Herzegovina	8 750	30.4
30	Latvia	16 312	47.8	76	Bolivia	4 816	30.3
31	Central Hungary	33 978	47.7	77	Egypt	6 281	30.1
32	Turkey	15 340	47.1	78	Ecuador	8 105	29.3
33	Uruguay	14 277	47.1	79	Philippines	3 940	29.0
34	Korea	29 004	46.7	80	Costa Rica	11 351	28.6
35	Italy	31 555	46.7	81	Iran	11 467	28.4
36	Hong Kong	46 157	46.2	82	Morocco	4 668	28.1
37	Colombia	9 392	45.9	83	Venezuela	11 956	27.8
38	Portugal	25 573	45.7	84	India	3 586	27.3
39	Croatia	19 516	45.6	85	Algeria	8 322	26.8
40	Japan	33 994	44.9	86	Zambia	1 550	24.6
41	Slovakia	23 897	44.8	87	Pakistan	2 674	23.4
	*Budapest**	*30 095*	*44.6*	88	Rwanda	1 155	23.1
42	**Hungary 2010**		**44.4**	89	Ghana	1 625	22.7
43	Peru	9 470	43.6	90	Guatemala	4 740	22.7
44	Romania	14 287	43.5	91	Angola	6 035	22.7
45	Lebanon	13 948	42.2	92	Uganda	1 263	22.4
46	Montenegro	12 676	42.1	93	Bangladesh	1 643	18.1

Source: authors' own construction

Note: *Hungary's ranking is shown in bold and Hungary's regional rankings are shaded.

However, according to the latest report of the Hungarian Central Statistical Office, Central Transdanubia's position has worsened lately. For example, both the FDI and the attracted overall domestic investment to the region seriously decreased in 2011 (KSH 2012).

In order to better understand the numbers behind the overall ranking, we provide Hungary's regional rankings for the three GEDI sub-indices, shown in Table 2 *Entrepreneurial Attitudes (ATT)*, *Entrepreneurial Abilities (ABT)* and *Entrepreneurial Aspirations (ASP).*

Table 2 Hungarian regions relative position: sub-index level and GEDI

	ATT		ABT		ASB		GEDI	
	Rank	**Value**	**Rank**	**Value**	**Rank**	**Value**	**Rank**	**Value**
Central Hungary		51.33		43.36		48.55		47.74
Central Transdanubia	5	33.41	6	38.23	6	39.28	5	36.98
Western Transdanubia	2	35.54	2	42.96	5	41.02	2	39.84
Southern Transdanubia	3	33.98	3	39.83	3	43.93	4	39.25
Northern Hungary	4	33.68	4	38.42	2	45.75	3	39.28
Northern Great Plain	6	32.53	5	38.26	7	38.23	6	36.34
Southern Great Plain	7	31.36	7	35.49	4	41.44	7	36.10
Budapest		42.47		43.68		47.77		44.64
Hungary 2011		**45.59**		**53.40**		**50.21**		**49.70**
Hungary 2010		**43.95**		**46.35**		**42.91**		**44.40**
Hungary 2008-2012		**37.93**		**42.25**		**43.45**		**41.21**

Source: authors' own construction

These sub-indices make up the overall GEDI score and address specific issues regarding entrepreneurship development. As depicted in Table 2, regional differences are the highest for the Entrepreneurial Attitudes. If we look at the top 3 ranking regions for all three sub-indices, we find that *Central Hungary (including Budapest), Western Transdanubia* and *Southern Transdanubia* hold the positions for Entrepreneurial Attitudes (ATT) and for Entrepreneurial Abilities (ABT). In the case of Entrepreneurial Aspiration (ASP), *Central Hungary (including Budapest)* takes the 1st place, while *Northern Hungary* holds the 2nd and *Southern Transdanubia* the 3rd.

6. Hungary's regions compared at GEDI's pillar level

In this section, we focus on the analysis of Hungary's 7 regions at the pillar level. Table 3 shows the pillar values for Hungary's regions and includes two additional useful benchmarks: the average pillar values for the most advanced innovation driven economies[9]

[9] Innovation driven economies are defined according to the World Competitiveness Survey categorization (Porter – Schwab 2008).

and the average value of Hungary's 7 regions. We also identify the most favorable and the least favorable pillar value for each region and benchmark.

The least overall regional pillar variance (0.01) was found in the case of the pillar capturing the regional entrepreneurial culture (cultural support), implying a relatively equal acceptance and recognition of the role of entrepreneurs throughout the 7 regions. While the overall regional pillar variance in the case of the pillar relating to the start-up skills (startup skills) appears to be quite large (0.25), since it ranges from 0.27 (Central Transdanubia) to 1.00 (Central Hungary). Examining the least favorable indicators, we see the difficulties facing Hungarian businesses across the regions to recognize and utilize good business opportunities and ideas exemplified by the *opportunity perception* pillar which is the weakest pillar in all regions. Since *opportunity perception* belongs to the ATT sub-index, it explains the generally weak performance of Hungary and the Hungarian regions in entrepreneurial attitudes. While *opportunity perception* appears to be the weakest pillar of the innovation-driven economies as well, but the difference is substantial. The innovation-driven country average is 0.53, and the Hungarian regional average is 0.19 (Hungary 2008-2012).

Table 3 Hungarian regions relative position: pillar level

Regions	1	2	3**	4	5	6**	7	8	9*	10	11	12	13**	14**	Less favorable*	Most favorable
Central Hungary	0.30	1.00	0.42	0.69	0.44	0.54	0.42	0.50	0.33	0.33	0.47	0.54	0.61	0.61	OPPORTUNITY PERCEPTION	STARTUP SKILLS
Central Transdanubia	0.15	0.27	0.42	0.52	0.45	0.61	0.26	0.39	0.43	0.37	0.37	0.49	0.50	0.42	OPPORTUNITY PERCEPTION	OPPORTUNITY STARTUP
Western Transdanubia	0.17	0.34	0.44	0.50	0.45	0.65	0.36	0.48	0.40	0.33	0.34	0.40	0.76	0.44	OPPORTUNITY PERCEPTION	INTERNATIONALIZATION
Southern Transdanubia	0.11	0.42	0.43	0.51	0.44	0.55	0.54	0.33	0.41	0.42	0.33	0.66	0.77	0.44	OPPORTUNITY PERCEPTION	INTERNATIONALIZATION
Northern Hungary	0.14	0.33	0.48	0.45	0.43	0.54	0.37	0.31	0.46	0.46	0.36	0.94	0.49	0.45	OPPORTUNITY PERCEPTION	HIGH GROWTH
Northern Great Plains	0.10	0.36	0.46	0.46	0.44	0.50	0.40	0.39	0.44	0.34	0.46	0.38	0.53	0.45	OPPORTUNITY PERCEPTION	RISK CAPITAL
Southern Great Plain	0.09	0.33	0.45	0.44	0.44	0.57	0.38	0.25	0.41	0.41	0.41	0.39	0.64	0.57	OPPORTUNITY PERCEPTION	INTERNATIONALIZATION
Budapest	*0.19*	*0.90*	*0.36*	*0.60*	*0.38*	*0.59*	*0.50*	*0.46*	*0.35*	*0.36*	*0.45*	*0.66*	*0.56*	*0.66*	*OPPORTUNITY PERCEPTION*	*STARTUP SKILLS*
Hungarian Regional Average	*0.15*	*0.44*	*0.44*	*0.51*	*0.44*	*0.57*	*0.39*	*0.38*	*0.41*	*0.38*	*0.39*	*0.54*	*0.61*	0.48	*OPPORTUNITY PERCEPTION*	*INTERNATIONALIZATION*
Hungary 2011	**0.30**	**0.55**	**0.54**	**0.55**	**0.45**	**0.55**	**0.84**	**0.43**	**0.49**	**0.41**	**0.44**	**0.68**	**0.76**	**0.39**	OPPORTUNITY PERCEPTION	TECHNOLOGY SECTOR
Hungary 2010	**0.24**	**0.58**	**0.58**	**0.55**	**0.42**	**0.56**	**0.56**	**0.50**	**0.36**	**0.32**	**0.39**	**0.51**	**0.63**	**0.43**	OPPORTUNITY PERCEPTION	INTERNATIONALIZATION
Hungary 2008-2012	**0.19**	**0.54**	**0.43**	**0.50**	**0.37**	**0.55**	**0.41**	**0.43**	**0.43**	**0.36**	**0.30**	**0.57**	**0.63**	**0.53**	OPPORTUNITY PERCEPTION	OPPORTUNITY STARTUP
Innovation-driven countries	*0.50*	*0.68*	*0.85*	*0.73*	*0.79*	*0.83*	*0.60*	*0.67*	*0.78*	*0.71*	*0.61*	*0.58*	*0.72*	*0.57*	*OPPORTUNITY PERCEPTION*	*NON-FEAR OF FAILURE*

Source: authors' own construction.

*Opportunity Perception (1); Startup Skills (2); Non-fear of Failure (3); Networking (4); Cultural Support (5); Opportunity Startup (6); Tech sector (7); Quality of Human Resources (8); Competition (9); Product Innovation (10); Process Innovation (11); High Growth Firm (12); Internationalization (13); Risk Capital (14). Innovation-driven countries: Source: The Global Competitiveness Report 2010-2011, page 11. List of innovation-driven countries: *Australia*, *Austria*, *Belgium*, Canada, Cyprus, Czech Rep., *Denmark*, *Finland*, *France*, *Germany*, Greece, Hong Kong, *Iceland*, *Ireland*, *Israel*, *Italy*, *Japan*, *Korea Rep.*, Luxemburg, Malta, *Netherland*, New Zealand, *Norway*, *Portugal*, Singapore, *Slovenia*, *Spain*, *Sweden*, *Switzerland*, United Arab Emirates, *United Kingdom*, *United States*. GEDI 2010 country scores are available only for countries in italics.

**Pillars where the institutional variable used is the same for all 7 regions.

7. A simulation on how to improve entrepreneurship in the Hungarian regions

An important implication of the GEDI is related on how to improve of the entrepreneurship scores. According to the PFB methodology the best progress can be achieved by abolishing the bottleneck, the weakest performing pillar. However, we should remember that the National System of Entrepreneurship is a dynamic system: if you alleviate one bottleneck, another factor soon becomes the most binding constraint for system performance. This raises the question of 'optimal' allocation of policy effort.

We simulated a situation in which all the Hungarian regions increased their allocation of entrepreneurship policy resources in an effort to gain 1% improvement in their entrepreneurial performance, as captured by the GEDI Index. The Penalty for Bottleneck method used in the GEDI index calculation implies that the greatest performance enhancement will be achieved when additional resources are always allocated to alleviating the most constraining bottleneck. Once the bottleneck pillar has improved sufficiently so as to no longer constitute the most important constraint to system performance, further resource additions need to be allocated to the next most severe bottleneck. We iterated this procedure until an overall GEDI Index performance of 1% in every country had been achieved. This simulation is based on two important assumptions: (1) we allocate additional resources over current resource allocation; and (2) the cost of improving performance is equal for all pillars. The result of the simulation is shown in Table 4.

This simulation produces a more nuanced picture of the required allocation of policy effort, if policy were to be optimized to maximize the GEDI index value. We can see that to improve the *2008-2012 Hungary*'s GEDI index score by 1%, an 'optimal' effort allocation would call for a 31% improvement in the *opportunity perception pillar*, a 20% in the process *innovation pillar* a 13% in *the opportunity perception pillar* and 12% in the *cultural support pillar*. Of the remaining effort, our simulation suggests that 8% should be allocated to tech sector and 6% to competition. Less than 5% new effort is necessary to enhance *non-fear of failure pillar* and *quality of human resources pillar*.

Table 4 Simulation of 'optimal' policy allocation to increase the GEDI score by 1% in the Hungarian regions

Region		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total effort
Central Hungary	A	0.23	0	0.11	0	0.09	0	0.12	0.03	0.2	0.2	0.07	0	0	0	**1.05**
	B	22%	0%	10%	0%	9%	0%	11%	3%	19%	19%	7%	0%	0%	0%	
Central Transdanubia	A	0.3	0.17	0.03	0	0	0	0.19	0.06	0.02	0.07	0.08	0	0	0.03	**0.95**
	B	32%	18%	3%	0%	0%	0%	20%	6%	2%	7%	8%	0%	0%	3%	
Western Transdanubia	A	0.29	0.13	0.02	0	0.01	0	0.1	0	0.06	0.13	0.13	0.06	0	0.02	**0.95**
	B	31%	14%	2%	0%	1%	0%	11%	0%	6%	14%	14%	6%	0%	2%	
Southern Transdanubia	A	0.33	0.02	0.01	0	0	0	0	0.11	0.03	0.02	0.11	0	0	0	**0.63**
	B	52%	3%	2%	0%	0%	0%	0%	17%	5%	3%	17%	0%	0%	0%	
Northern Hungary	A	0.31	0.13	0	0.01	0.03	0	0.08	0.17	0	0	0.1	0	0	0.01	**0.84**
	B	38%	16%	0%	1%	4%	0%	10%	17%	0%	0%	12%	0%	0%	1%	
Northern Great Plains	A	0.35	0.1	0	0	0.01	0	0.06	0.06	0.01	0.11	0	0.07	0	0	**0.77**
	B	45%	13%	0%	0%	1%	0%	8%	8%	1%	14%	0%	9%	0%	0%	
Southern Great Plain	A	0.33	0.09	0	0	0	0	0.04	0.17	0.02	0.01	0.01	0.04	0	0	**0.71**
	B	46%	13%	0%	0%	0%	0%	6%	24%	3%	1%	1%	6%	0%	0%	
Budapest	*A*	*0.29*	*0*	*0.12*	*0*	*0.1*	*0*	*0*	*0.02*	*0.12*	*0.12*	*0.03*	*0*	*0*	*0*	***0.8***
	B	*36%*	*0%*	*15%*	*0%*	*13%*	*0%*	*0%*	*3%*	*15%*	*15%*	*4%*	*0%*	*0%*	*0%*	
Hungary 2011	**A**	**0.26**	**0.01**	**0.02**	**0.01**	**0.11**	**0**	**0**	**0.13**	**0.06**	**0.15**	**0.11**	**0**	**0**	**0.17**	**1.03**
	B	**25%**	**1%**	**2%**	**1%**	**11%**	**0%**	**0%**	**13%**	**6%**	**15%**	**11%**	**0%**	**0%**	**17%**	
Hungary 2010	**A**	**0.28**	**0**	**0**	**0**	**0.11**	**0**	**0**	**0.02**	**0.16**	**0.2**	**0.13**	**0.01**	**0**	**0.1**	**1.01**
	B	**28%**	**0%**	**0%**	**0%**	**11%**	**0%**	**0%**	**2%**	**16%**	**20%**	**13%**	**1%**	**0%**	**10%**	
Hungary 2008-2012	**A**	**0.29**	**0**	**0.05**	**0**	**0.11**	**0**	**0.08**	**0.05**	**0.06**	**0.12**	**0.19**	**0**	**0**	**0**	**0.95**
	B	**31%**	**0%**	**5%**	**0%**	**12%**	**0%**	**8%**	**5%**	**6%**	**13%**	**20%**	**0%**	**0%**	**0%**	

Source: authors' own construction

Note: *A: Required increase in pillar; B: Percentage of total effort.
Variables from 1 to 14 are the same as in Table 3.

Although, looking at Table 4 it is apparent that the 'optimal' policy mix is different for the 7 regions of Hungary, all regions need to improve the *opportunity perception pillar*: for example, for Central Hungary there is necessary to focus only the 22% of new resources on this pillar, while for South Transdanubia requires the 52%, all the other regions are between these two extremes. The regions are also differing regarding their required total efforts to improve their GEDI score by 1%: for Southern Transdanubia there are only 0.63 new resources necessary, while for Central Hungary 1.05.

8. Conclusion

Over recent years, increasing attention has been paid to the role that regional level factors play in driving entrepreneurship and thereby regional and national development. Within the EU an important aim is to decrease regional inequalities. Despite enormous efforts,

regional disparities in many countries have been increasing. The examination of the drivers of entrepreneurship at the regional level may explain some of the reasons for these continuing regional inequalities.

In this paper, we adapted the GEDI Index to a regional analysis of Hungary's 7 regions. While the Hungary's regional GEDI values are calculated in the same way as would be those of independent countries, our analysis focuses on comparing the Hungarian regions to each other. The Hungarian regions are investigated in terms of the GEDI, the sub-index as well as in the pillar level. According to the regional GEDI scores, Central Hungary has a relative better position, while the remaining 6 regions do not differ from each other regarding their entrepreneurial attitudes, abilities or aspirations to a great extent.

The Hungarian regions are found to be *particularly weak in the entrepreneurial attitudes* and *aspiration related pillars*. On the one hand, the results show that Hungarian firms exhibit *reduced levels of innovation activity*. Some of the causes can be found in the economic structure of Hungarian firms which are focused mainly in services and also the lags in their incorporation of new technologies. Taken together, these all have a negative effect on the productivity and growth of firms. Approximately 2/3 of the R&D expenditures were concentrated in the Central Hungarian region in 2011. Considerable research activity can be found in Northern Great Plain and Southern Great Plain as well, due to their quite large research bases relating to traditional sectors (e.g. agriculture) (KSH 2012).

Finally, the analysis based on the individual characteristics of Hungarian entrepreneurs (potential entrepreneurs) shows that Hungarian entrepreneurs *lack of start-up skills* and generally also *exhibit a negative attitude towards the potential economic or business opportunities*. The number of existing firms is one of the most important indicators of economic performance. The expansion of firms compared to the last year is quite modest (only 2.7%). Central Hungary can be characterized by the highest firm density, while the expansion in the number of existing firm in Northern Hungary, Southern Hungary and Central Transdanubia was restrained (KSH 2012).

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Appendix 1 A description of the regional-level individual variables used

Individual variable	**Description**
OPPORTUNITY	The percentage of the 18-64 aged population recognizing good conditions to start business next 6 months in area he/she lives,
SKILL	The percentage of the 18-64 aged population claiming to posses the required knowledge/skills to start business
NONFAIRFAIL	The percentage of the 18-64 aged population stating that the fear of failure would not prevent starting a business
KNOWENT	The percentage of the 18-64 aged population knowing someone who started a business in the past 2 years
NBGOODAV	The percentage of the 18-64 aged population saying that people consider starting business as good carrier choice
NBSTATAV	The percentage of the 18-64 aged population thinking that people attach high status to successful entrepreneurs
CARSTAT	The status and respect of entrepreneurs calculated as the average of NBGOODAV and NBSTATAV
TEAOPPORT	Percentage of the TEA* businesses initiated because of opportunity start-up motive
TECHSECT	Percentage of the TEA businesses that are active in technology sectors (high or medium)
HIGHEDUC	Percentage of the TEA businesses owner/managers having participated over secondary education
COMPET	Percentage of the TEA businesses started in those markets where not many businesses offer the same product
NEWP	Percentage of the TEA businesses offering products that are new to at least some of the customers
NEWT	Percentage of the TEA businesses using new technology that is less than 5 years old average (including 1 year)
GAZELLE	Percentage of the TEA businesses having high job expectation average (over 10 more employees and 50% in 5 years)
EXPORT	Percentage of the TEA businesses where at least some customers are outside of the country (over 1%)
INFINVMEAN	The mean amount of 3 year informal investment
BUSANG	The percentage of the 18-64 aged population who provided funds for new business in past 3 years excluding stocks & funds, average
INFINV	The amount of informal investment calculated as INFINVMEAN* BUSANG

Source: authors' own construction

Note: *TEA (Total Entrepreneurial Activity) = the proportion of the 18-64 year aged working population who are in the process of business start-up and/or having an operating young venture.

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Appendix 2 A description of GEDI's national and regional institutional variables used

Institutional variable	Description	Source of data	Data availability
MARKETDOM	**Country level:** Domestic market size that is the sum of gross domestic product plus value of imports of goods and services, minus value of exports of goods and services, Data are from 2012.	World Economic Forum	The Global Competitiveness Report 2012-2013, p. 496. http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2012-13.pdf
	Hungary's regional data: calculation based on the EU regional competitiveness market size calculation, rescaling the variable to a 7 point Likert scale (calculation method in Appendix A-3).	EU Regional competitiveness 2010	Based on: EU Regional Competitiveness Index 2010, p. 154.
URBANIZATION	**Country level:** Urbanization that is the percentage of the population living in urban areas, data are from the Population Division of the United Nations, 2011.	United Nations, World Urbanization Prospects: The 2011 Revision	Percentage of population residing in urban areas, 1950-2050 http://esa.un.org/unpd/wup/CD-ROM/Urban-Rural-Population.htm
	Hungary's regional data: same as above. Data are from 2000-2001.	OECD Regional Typology	OECD Regional Typology, Directorate for Public Governance and Territorial Development, 22 February 2010, p. 21. OECD, StatExtracts http://stats.oecd.org
MARKETAGGLOM	The size of the market: A combined measure of the domestic market size and the urbanization that later measures the potential agglomeration effect. Calculated as MARKETDOM*URBANIZATION.	Own calculation	-
EDUCPOSTSEC	**Country level:** Gross enrolment ratio in tertiary education, 2010.	UNESCO Institute for Statistics	World dataBank, World Development Indicators (WDI) http://data.worldbank.org/indicator/SE.TER.ENRR/countries?display=default
	Hungary's regional data same as above. Data are from 2011.	Eurostat, Education indicators by NUTS 2 regions	http://appsso.eurostat.ec.europa.eu/nui/setupModifyTableLayout.do
BUSINESS RISK	**Country and regional level data source is the same:** The business climate rate "assesses the overall business environment quality in a country… ".The alphabetical rating is turned to a seven point Likert scale from 1 ("D" rating) to 7 (A1 rating). 30. Data are from 2008 except 2009 countries that are from 2009.	Coface	Business Climate Assessment, Coface Country Risk and Economic Research, January, 2013 http://www.coface.com/CofacePortal/COM_en_EN/pages/home/risks_home/business_climate
INTERNETUSAGE	**Country level data**: The number Internet users in a particular country per 100 inhabitants, 2010.	International Telecommunication Union	ICT Statistics, ITU ICT Eye http://www.itu.int/ITU-D/ICTEYE/Default.aspx
	Hungary's regional data: same as above. Data are from 2011.	Eurostat, Regional information society	http://appsso.eurostat.ec.europa.eu/nui/show.do

		statistics	
CORRUPTION	**Country level data**: The Corruption Perceptions Index (CPI) measures the perceived level of public-sector corruption in a country. " Data are from 2012.	Transparency International	http://cpi.transparency.org/cpi2012/in_detail/
	Hungary's regional data based on a standardized variable combining education, health, and general public corruption in addition to law enforcements and bribe payment. Calculation is based on Charron et al (2011) , rescaling it to a 10 point scale (see A-3 Appendix for details). Data are from 2009.	Charron et al (2011)	EU QoG Corruption Index (EQI) http://www.qog.pol.gu.se/data/datadownloads/qogeuregionaldata/
FREEDOM	**Country and regional level data source is the same:** "Business freedom is a quantitative measure of the ability to start, operate, and close a business that represents the overall burden of regulation, as well as the efficiency of government in the regulatory process. Data are from 2013.	Heritage Foundation/ World Bank	2013 Index of Economic Freedom http://www.heritage.org/index/visualize
TECHABSORP	**Country level data**: Firm level technology absorption capability: "Companies in your country are (1 = not able to absorb new technology, 7 = aggressive in absorbing new technology)". Data are 2011-2012 weighted average.	World Economic Forum	The Global Competitiveness Report 2012-2013, p. 489. http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2012-13.pdf
	Hungary's regional data proxied by the technological readiness data from the EU regional competitiveness index and rescaling it to the original 7 point scale (see A-3 Appendix for details).	EU Regional competitiveness 2010	Based on: EU Regional competitiveness 2010, p. 176
STAFFTRAIN	**Country level data**: The extent of staff training: "To what extent do companies in your country invest in training and employee development? (1 = hardly at all; 7 = to a great extent)". Data are 2011-2012 weighted average.	World Economic Forum	The Global Competitiveness Report 2012-2013, p. 447. http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2012-13.pdf
	Hungary's regional data proxied by the Higher education and life long learning sub-index data from the EU regional competitiveness index and rescaling it to the original 7 point scale (see A-3 Appendix for details).	EU Regional competitiveness 2010	Based on: EU Regional competitiveness 2010, p. 126.
MARKDOM	**Country and regional level data sources are the same:** Extent of market dominance: "Corporate activity in your country is (1 = dominated by a few business groups, 7 = spread among many firms)". Data are 2011-2012 weighted average.	World Economic Forum	The Global Competitiveness Report 2012-2013, p. 451. http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2012-13.pdf
TECHTRANSFER	**Country level data**: These are the innovation index points from GCI: a complex measure of innovation. Data are 2011-2012 weighted average.	World Economic Forum	The Global Competitiveness Report 2012-2013, p. 20. http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2012-13.pdf
	Hungary's regional data proxied by the Innovation sub-index data from the EU regional competitiveness index and rescaling it to the original 7 point scale (see A-3 Appendix for details).	EU Regional competitiveness 2010	Based on: EU Regional competitiveness 2010, p. 204.
	Country level data: Gross domestic expenditure on Research & Development	UNESCO Institute	http://stats.uis.unesco.org/unesco/ReportF

GERD	(GERD) as a percentage of GDP. Data are from 2010.	for Statistics	olders/ReportFolders.aspx?IF_ActivePath=P,54
	Hungary's regional data: same content, regional level application	Eurostat Regional Database, R&D expenditure and personnel	http://appsso.eurostat.ec.europa.eu/nui/show.do
BUSS STRATEGY	**Country level data**: Refers to the ability of companies to pursue distinctive strategies, which involves differentiated positioning and innovative means of production and service delivery. Data are 2011-2012 weighted average.	World Economic Forum	The Global Competitiveness Report 2012-2013, p. 20. http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2012-13.pdf
	Hungary's regional data proxied by the Business strategy sophistication sub-index data from the EU regional competitiveness index and rescaling it to the original 7 point scale (see A-3 Appendix for details).	EU Regional competitiveness 2010	Based on: EU Regional competitiveness 2010, p. 188.
GLOB	**Country and regional level data sources are the same:** A part of the Globalization Index measuring the economic dimension of globalization. Data are from the 2012 report and based on the 2009 survey.	KOF Swiss Economic Institute	Dreher, Axel (2006): Does Globalization Affect Growth? Evidence from a new Index of Globalization, *Applied Economics 38*, 10: 1091-1110. http://globalization.kof.ethz.ch/
DCM	**Country and regional level data sources are the same:** The Depth of Capital Market is one of the six sub-indices of the Venture Capital and Private Equity index.	EMLYON Business School France and IESE Business School, Barcelona, Spain	Groh, A, H.Liechtenstein and K. Lieser 2012 The Global Venture Capital and Private Equity Country Attractiveness Index 2012 Annual, http://blog.iese.edu/vcpeindex/about/

Source: authors' own construction

Appendix 3 Structure of the Global Entrepreneurship and Development Index

GLOBAL ENTREPRENEURSHIP AND DEVELOPMENT INDEX														
Entrepreneurial Attitudes Sub-Index					**Entrepreneurial Ability Sub-Index**				**Entrepreneurial Aspirations Sub-Index**					
OPPORTUNITY PERCEPTION	***OPPORTUNITY***	**STARTUP SKILLS**	***SKILL***	**NONFEAR OF FAILURE**	***NONFEAR***	**NETWORKING**	***KNOWENT***	**CULTURAL SUPPORT**	***CARSTAT***	**OPPORTUNITY STARTUP**	***TEAOPPORT***	**TECHNOLOGY SECTOR**	***TECHSECT***	**QUALITY OF HUMAN RESOURCES**	***HIGHEDUC***	**COMPETITION**	***COMPET***	**NEW PRODUCT**	***NEWP***	**NEW TECH**	***NEWT***	**HIGH GROWTH**	***GAZELLE***	**INTERNATIONALI-ZATION**	***EXPORT***	**RISK CAPITAL**	***INFINV***
	MARKETAGGLOM		EDUCPOSTSEC		BUSINESS RISK		INTERNETUSAGE		CORRUPTION		FREEDOM		TECHABSORP		STAFFTRAIN		MARKDOM		TECHTRANSFER		GERD		BUSS STRATEGY		GLOB		DCM

Source: author's own construction based on Ács – Szerb (2010)

Note: *The GEDI is a super-index made up of three sub-indexes, each of which is composed of several pillars. Each pillar consists of an institutional variable (denoted in *bold*) and an individual variable (denoted in ***bold italic***). The data values for each variable are gathered from wide ranging sources.

Appendix 4 The rescaling of the regional variables for the level and range of the country level variable

Example: MARKETSIZE

MARKETSIZE = Hungary's average market size from World Economic Forum = 3.9

Maximum MARKETSIZE = 7 Country maximum market size from WEF

$MARKETSIZE_j$ = the applied market size variable for the j^{th} Hungarian region

$REGMARKETSIZE_j$ = jth region market size from Regional Competitiveness score j= 1,……k, k is the number of region in Hungary

Maximum $REGMARKETSIZE_j = 100$

AVREGAMARKETSIZE = regional average market size as the average of a country regional market size values

$MARKETSIZE_j$ = MARKETSIZE + (REGMARKETSIZE$_j$ – AVREGAMARKETSIZE)(7 – 3.9) / (100 – AVREGAMARKETSIZE

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University of Szeged, Doctoral School in Economics, Szeged, pp. 190-203. (ISBN 978-963-306-222-7)

13. Informal Relations and the Innovation Problem in Hungarian Healthcare: A Discussion about Data Collection and Initial Findings Using LinkedIn and USPTO Data

Michelle Crosby-Nagy - Cheng Wanpeng

Monitors of innovation performance from all of the major sources: Eurostat, the World Bank and the World Economic Forum continue to show the failure of European transformed societies (post-communist) to make significant progress in innovation (the market application of recombined knowledge) relative to non-transformed societies.

The purpose of this paper[1] *is to identify the obstacles to the invention, adoption and diffusion of cutting-edge health-related inventions (new knowledge, medical devices, medications, and therapies) and firm performance that are due to the structure, composition, magnitude and significance of informal networks in the healthcare industry (from bench to bedside) in Hungary. To achieve a higher level of understanding about the composition (the ratio of personal contacts to arms length contacts) of firm-firm informal (non- contract-based) networks and their effect on innovation and firm performance, three basic questions must be addressed: What is the relationship between informal ties and firm performance in healthcare-related innovation networks in Hungary? What is the magnitude and significance (if there is any) of the effect? What are the implications of the findings from one and two for innovation policy in the transformed societies?*

1. Introduction

Several factors drive today's trends in global drug research and healthcare: changing population demographics; the availability of big data; the growing interest in self-diagnosis; the economic recession; and growing levels of access to the internet and mobile technology. These trends make a deeper understanding of the optimal advancement of life sciences and its translation to marketable products and services for the sick and the aging a necessary course of action. A timely study of the healthcare industry in so called "emerging" economies" is all the more important given the aim of the European Union to maximize social cohesion among and within the EU-27 through a decline in health-related inequalities and because it is expected that innovation will become more globally distributed in the future.

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How will innovation become more globally distributed; and most importantly, where? Monitors of innovation performance from all major sources: Eurostat, the World Bank and the World Economic Forum continue to show the failure of European transformed societies (post-communist) to make significant progress in innovation (the market application of recombined knowledge) (Schumpeter 1943) relative to non transformed societies. Decades after transition, Hungarian performance is still low, appearing as a "moderate innovator" in the 2011 EU Scoreboard. According to the "innovation network" metrics (international, co-publications, public-private partnerships), Hungarian performance is still notably poor; however all the transformed societies perform orders of magnitude lower than the Scandinavians (especially Sweden) on this measure.

Hungary does extremely well however in the "innovation cooperation" measure of the Community Innovation Survey (waves 2006, 2008, 2010). Indeed, there appears to be no significant difference in the mean percent levels of cooperation between the transformed and non transformed countries in the 2006 and 2008 waves (Crosby-Nagy). In terms of global drug research, Hungary placed well in the region according to the numbers of papers funded by Big Pharma with at least one CEE author; where, Hungary was second in CEE only to Poland in number of papers funded from 1989 to 2010 (Crosby-Nagy 2011).

Hungarian performance in public health outcomes such as peri-natal health has improved but still need work; especially with regards to infant mortality and birth weight.[2] In international comparison, there is great cause for concern according to maternal death and preterm birth indicators[3]. The purpose of the dissertation is to identify the obstacles to the invention, adoption and diffusion (Coleman et al. 1957, Hagerstrand 1967, Halila 2007, Loof − Brostrom 2008, Valente 1996, Wejnert 2002, Griliches 1957) of cutting-edge health-related inventions (new knowledge, medical devices, medications, and therapies) and firm performance that are due to the structure, composition, magnitude and significance of informal networks in the healthcare industry (from bench to bedside) in Hungary. Where, "composition" is defined as the ratio of personal contacts to arm's length contacts (Granovetter 2008, Uzzi 1997) of firm-firm informal (non contract-based) networks. As a result, three basic questions are of interest here: What is the relationship between informal ties and firm performance in healthcare-related innovation

[2]http://www.tarki.hu/en/research/childpoverty/tarki_chwb_mainreport_online.pdf; p. 82.
[3]http://www.europeristat.com/images/doc/EPHR/european-perinatal-health-report.pdf; p. 99, 132.

networks in Hungary? What is the magnitude and significance (if there is any) of the effect? What are the implications of the findings from one and two for innovation policy in the transformed societies?

2. Background

The "innovation problem" in CEE is attributed to a variety of institutional and macro-level factors. "Laggard" and "catching-up" status has specifically been attributed to the failure of policies both industrial and innovation-wise, a lack of significant investment in innovation inputs by firms and governments, historical heritage, measurement error, cultural values, business climate, the shadow economy and poor quality scientific personnel (Graham et al. 1992, Taylor − Wilson 2012, Zelizer − Rotman 2010, Lippenyi 2007, Griliches 1957, Andreff 2001, Brouthers et al. 2001, Glovackas 2005, Radosevic 1999, Radosevic 2002, Sporer 2004). Some scholars from the network perspective also attribute the problem to a severe disconnect among the system of innovation (government-university and industry) including the so called "invisible college" (Price 1971) i.e. overall poor connectivity within the system domestically and poorly formed connections external to the system internationally (Chaminade − Edquist 2006, Evangelista et al. 2002, Feinson 2003, Niosi − Saviotti 1993, Katz − Shapiro 1994, Leydesdorff 2009, Nelson 1993, Lundvall − Tomlinson 2000, Lundvall 2011, Inzelt 2008, 2004, 2003, Rosenberg 1976, Klein − Solem 2008, Kreiner − Schultz 1993, Leydesdorff − Wagner 2008).

The role of networking, also known as "innovation cooperation" has become of increasing importance to policy makers, due to the discovery of its function as a driver in product innovation (the creation of new products and services). Intra-industry linkages play a major role in firm strategic behavior, which affects productivity. And, government- university- industry relationships play an increasing role as knowledge becomes the primary source of power in an economy (Etzkowitz 2002). Other networks such as research networks are appearing more often in EU policy such that they now serve as an important piece of "socio-economic infrastructure" (Cassi et al. 2008).

"Innovation networks", often measured by formalized relations such as co-publications, strategic alliances between firms, funded research at universities etc., have been called the *sine quo non* of innovation (Agapitova 2003, Caniglia 2001, Cassi et al. 2008, Coe − Bunnell 2003,

Gossart − Özman 2008, Saxenian 2002, König et al. 2011, Ciarli 2010, Kreiner − Schultz 1993, Lombardi 2010, Schilling − Phelps 2007, Hagedoorn − Vonortas 2003, Okamura − Vonortas 2006, Feldman − Link 2001). The formulation of innovation networks are also at the heart of innovation policy in the European Union. Cluster policy, the creation of science parks, and incentives for cooperation are just some of the ways governments have tried to intervene in the innovation process in the EU using the idea of relationship building. Clusters are based on the idea that bringing businesses closer together physically will result in better research translation (Kamath et al. 2012, Melnik et al. 2011, Phlippen − der Knaap 2007)

"Designed networks" as opposed to "emergent networks" rarely produce desired results in biotechnology for example. This is perhaps due to a misconception about how tacit knowledge is transferred. A study of transfer of know-how in the manufacturing industry (Eric 1987) showed that conferences acted as an important medium for partner search and selection. Individuals would attend conferences, meet people, create a short-list of people who might be important and then contact those people when in need of advice to solve a problem. Survey data of 71 polish enterprises in 1998 explored the idea of tie-formation as a result of strategic interdependencies where social capital is describe in terms of "relational assets" and that those have opportunity costs, which can give rise to lock-in. They noted that a large number of links among peers means power and influence such that a partner can exert this power by not cooperating.

Formal and informal ties are used differently by different sectors— where, the more knowledge intensive sectors such as the chemicals sector tend to create both research partnerships and inter-firm alliances as opposed to the manufacturing sector which tends to create ties with its supply chain and customers. Additionally, informal ties are mostly used in the chemicals sector for gaining new information and formal ties are used for maintaining relationships. Firms also create ties in order to access information with varying intensity and as the result of firm size. Small firms in the chemicals sector may partner more because they simply don't have the capability to perform in-house R&D. In addition they may have more informal partnerships since small firms are likely to be younger firms and therefore have a need to achieve more immediate results with new information from informal ties.

The literature linking networking and innovation performance as well as business activity is sparse, but contains a few classics. Ruef (2002) tries to understand network structure and cultural factors and their relationship to organizational innovation using survey-based probit

analysis of 700 company start-ups (Ruef 2002). Most of the hypotheses (out of 9) were not significant when the dependent variable was patent applications; however, when teams were asked their impression of innovation activity, the hypotheses were significant. Thus, effects were seen in magnitude, but did not necessarily rule out the possibility that they were due to chance. Uzzi's 1997 Paradox of Embeddedness found networks can improve efficiency, but can also impede progress (Uzzi 1997). Granovetter's Strength of Weak Ties (1973, 1995), befitting the chemicals sector, showed that weak ties are useful for obtaining new information, strong ties (of friends and family) are ties that require continual maintenance (Granovetter 1973, Granovetter 1985). Contributing to the so called "paradox" of embeddedness, Burt in 1992 found strong ties can be sources of redundant information (Burt 1995).

It is important to note that all the above studies treat the firm as the unit of analysis. This idea was challenged by Saxenian (1996), where she suggests that regional networks should not be thought of as networks of firms, but rather networks of people (Saxenian 1996). Such an approach is largely reflected in the all aspects of the dissertation, from hypotheses to operationalization of variables.

3. Hypotheses

When innovation networks are thought of as teams, which are assembled based on certain rules of attachment (Powell et al. 2005), these rules of assembly appear unhealthy for optimal invention, adoption and diffusion of innovations and finally firm profit in Hungary. Specifically, it is supposed that they contain a suboptimal mix of personal and "arm's length" (Uzzi 1997, Granovetter 1985, Granovetter 1973, Granovetter 1995, Granovetter 2005, Granovetter 2008) exchanges. A similar hypothesis was tested in (Ruef 2002) using patent applications as a dependent variable and strong/weak ties as the explanatory variables . It is suspected that LinkedIn as a data source is more accurate at delineating between friends (people of former places of work and study) and „arms-length" contacts (everyone else) and will yield better results.

H1: Actors in Hungarian healthcare have a suboptimal mix of personal and arm's length connections according to their online professional network in LinkedIn.

H2: Actors with suboptimal mixes have companies that perform worse patent-wise than Actors with more optimal mixes (not too much of one kind).

Further, when innovation networks are thought of as teams, which are assembled based on certain rules of attachment (Powell et al. 2005), these rules of assembly in transformed societies are unhealthy for invention, optimal innovation adoption and diffusion and finally firm profit. Rules that govern these attachments might include: party competition (Vedres − Stark 2010, Vaan et al. 2011, Gernot − Stark 1996, Stark 1996, Vedres − Stark 2008). Where, the party affiliation can be identified by the year the company was founded and its correspondence with the majority party.

H3: Poor innovation performance is also due to: party competition; namely, Actors whose party flags align with the majority perform better patent-wise than those who align with the minority.

Finally, it is suspected that the current attachment rules in innovation networks will begin to matter less and less over time because they are a function of the society's market evolution ("catching-up"). As long as the market continues to progress, the composition of innovation networks will evolve towards a better mix of personal and arms-length contacts that will result in better innovation outcomes. The same hypothesis was tested in Uzzi 1997.

H4: "the weaker the ability of prices to distill information, the more organizations will form embedded ties".

4. Discussion: exploring innovation networks using LinkedIn

What is LinkedIn? LinkedIn is a publically traded for profit corporation founded in 2003, which, according to Wikipedia, had over 200 million users as of January 2013 in more than 200 countries and territories. Claiming to be a social networking site for professionals, LinkedIn is free for creating an online profile, and for connecting with others, but offers upgrades for a fee; primarily targeting sales professionals, job seekers and employers. The US population is the highest represented, followed by India, then the UK; with the fastest rate of growth in the Netherlands.

Making Connections: You are technically able to try to connect with anyone, including people who are not members of LinkedIn, however, the user agreement advises that you don't try to connect with people you do not know, nor accept requests from users you do not know. Nonetheless, you are able to connect to people you wish to connect with by tagging them as a

personal or professional contact. LinkedIn will call up your former places of work or study when you wish to connect with someone. Or, you can provide the email address of the person. Or you can simply select "friend" and wait for them to accept your invitation. Should you build up a record of too many instances where the other party told the system you invitations were spam, or that they did not personally know you then your account could be closed.

Once someone becomes a 1st degree connection to you, your 2nd degree connections become much larger; that is, you are able to see all the people who are one connection away from you such that, should you try connect, the other party will see you have one person in common, a shared connection.

Code of Conduct: This brings up two issues with regard to using LinkedIn for data collection and analysis.

1. It not crystal clear whether "friending" someone, that is, trying to connect with them as a stranger, is “breaking the rules of the site”. Assuming that when one selects friend, they mean "let's be friends" since if that were your friend, you would most likely have their email address to provide, or have some outside connection such as former place of work or study; except in the very rare cases that your network consisted primarily of your high school friends or friendships that naturally emerged from childhood and you also had no common place of work or study later on); and
2. When someone accepts your friend request, in most cases you are able to see their entire network. (They can however restrict you from seeing their own network should they wish to.) You are then limited to seeing only certain information about their 2nd degree connections - something similar to a business card that contains current and former places of work/study. And most of the time full name and location. When someone gives you full access to their information and their own connections as well as when they join and actively participate on the site, are they consciously agreeing to your analysis of their connections?

LinkedIn as Ego-Centered Networks: The code of conduct/ethics discussion is relevant when discussing the use of LinkedIn as a vessel for ego-centered network analysis. Traditional ego-centered network analysis uses surveys of live people that provide alters through name generation. Such surveying techniques are costly and have various effects such as order-effects,

fatigue, satisficing, non-redundancy, as well as interviewer effects. The advantage of using online networks for personal network research where there is usually a disadvantage when using surveys are in terms of: cost, interrelation, and accuracy. However one is still faced with other common problems of personal network research: the bounds of the network (where does it end?), assessment of negative ties (who is the Ego not connecting with?) and in the most crucial of ways, how to interpret the tie itself when no name generation question was given.

Why do people join LinkedIn/What does a connection represent? Interpreting the tie, is then perhaps one of the most difficult challenges presented by network analysis of online social networks. In order to answer this question, we begin by asking: why do people use LinkedIn?

Seeking Jobs: Many people think of LinkedIn as a site where one can look for jobs and be seen by employers looking for talent. But especially today, how much activity does this really explain?

Keeping up with industry trend: LinkedIn advertises that one can "keep up with industry trends" using LinkedIn. It is safe to say, this is not likely the first order reason people use the site, but is still important.

Keeping an online rolodex: Another share of activity might be explained by individuals who use LinkedIn to keep an online rolodex. Someone they met at a party, a networking event, at a meeting, wishing to create a weak tie with that person, to share his/her resume in order to build credibility, but do not necessary have the intention of seeking a job from that connection's firm. LinkedIn might serve as an avenue to keep a business door open, as opposed to trying to connect on the more personal social networking site Facebook.

Connecting with the West: Given the skewed distribution of users from the United States, it might be the case that entrepreneurs who are interested in growing their network of "Western" contacts join LinkedIn. So for example, Chinese CEOs who want to find business opportunities outside China, would network on LinkedIn, but not those who are primarily interested in doing business in China. Those who are primarily interested in doing business in China might be using a Chinese version of LinkedIn. This highlights another aspect of the site, that should be taken into consideration, which is, that LinkedIn operates in as many languages as it does countries. So, people who are using the English language LinkedIn site, are most definitely looking to connect outwards more so than inwards.

Connections as informal networks: So long as tacit knowledge is still transferred through people, as the LinkedIn slogan goes, *Relationships Matter*. The connection between two people on LinkedIn would not likely be considered a formalized relationship, since there is no legal contractual arrangement between the two parties nor their company or institutional affiliations. There might indeed be something of an implicit mutual acceptance, but we can safely assume that there is no legally binding agreement between an Ego and its Alter and thus, can interpret LinkedIn networks as "informal".

Connections as "innovation networks": It is speculated that informal networks give rise to formal networks, especially in the case of a firm's desire to access external sources of knowledge—its innovation network. One could interpret an online professional networking site containing a virtual "rolodex", as an Ego's informal network, standing by as a resource to be called upon when needed. Further, when Ego is a proxy for the firm itself, one can view Ego's alters as a firm's potential sources of external knowledge - the building blocks for future, formalized, contract-based partnerships and arrangements whether they be potential partners for sharing risk when entering a new market, or candidates for co-publication.

Data Collection Method: The above conceptualization of LinkedIn - that is, LinkedIn as informal innovation networks, highly influenced how we chose to grab data from LinkedIn. We first used the company search feature to identify small and medium sized companies, then isolated them by industry (biotech and pharma) and then by country (V4, Russia, China and Germany) using the filters provided. (We did not upgrade our LinkedIn account in order to access these companies, just the regular free version.) Then we clicked on each company and "friended" those with the title of CEO, Director, Founder, or Co-Founder, which appears to right of the company profile. We then used a systematic random sampling method to explore the composition of each Ego's (CEO) network of alters. We collected data on 10% of each Ego's network as well as information about each Ego. (Indeed it was difficult to select a sampling method. And there may very well be a periodic bias to the systematic random method we chose since we do not know the algorithm used to display the list of alters when one views an Ego's network.)

From the beginning we knew that the populations we would be dealing with would be small, made smaller by the companies that have employees that are using LinkedIn and then made smaller still by those who chose to accept the friend request. In the early days we tried to track our

"acceptance rate", but then quickly found that the population was growing by day and in some cases exponentially. Obviously the latter has implications about the representability of the Ego set, in addition to the problem of the nonrandom nature of acceptance of the "friend" request.

The acceptance of a "friend" request is interesting as an Ego-centered network study in itself. We found that CEOs from developing countries quickly accepted friend invites. The German acceptances were much slower such that we had to use a different strategy for those CEOs. For Germany we tried to leverage first degree connections by calling up all these in the pharma and biotech industries in Germany and then viewed my 2nd degree connection. Then we sent a friend request to those CEOs, with whom we had one contact in common. This strategy was effective. Next we filtered those contacts by employee size.

Finding Hungarian inventors using the USPTO Database: The trial data grab of USPTO patents contained all Hungarian inventors from all industries in 2007. After isolating inventors in the healthcare industry using the title, international class, field and place of first ranked author, very few of these inventors were identified on LinkedIn (about 4 out of about 15). For example the entire medical probe team is missing from LinkedIn. Incidentally, this team also lacked international partners. (Where there was a US member of the team, these Hungarian inventors did tend to have a LinkedIn account.) A problem the arose with identifying the inventors on the LinkedIn site when there were several people with the same name, and one could not be sure which industry that person now works in.

5. Initial observations

The above data collection strategy allowed us to feign embeddedness in the biotechnology and pharmaceuticals industries; where, each friend request increased the likelihood that the next CEO would accept the invitation exponentially. This suggests further support for Barabasi's scale-free network concept (the larger my network becomes the larger my network will become). Those who do not yet have a connection to me will see that I have connections to their connections and decide to connect based on this mechanism - i.e preferential attachment. However, we must not rule out the idea that there could be other possible attachment mechanisms.

Next we noticed that CEOs in the V4, Russia and Germany tended to be of that country's majority ethnicity. However, a lot of variation was found in the ethnicity of the leadership of the

Chinese companies. In the Chinese case, leadership tended not to be of Chinese origin (as determined by last name) and in some cases, companies that appear in the initial firm search with a China filter, did not match the same location when the leadership was then identified (there was an India-located CEO whose company appeared in the Chinese search).

Initial findings show that the Hungarian CEO networks vs. the Hungarian Inventor networks vary by size of their LinkedIn networks. Of the four inventors who accepted the friend request, only one had more than 50 connections, and that person had over 500 connections.

Finally, on composition, initially it appears that former place of study explains variation in many of the Hungarian CEO network-ties; with the University of Szeged being a hub. One important observation is that some Ego's alters have over 500 ties and some have fewer than 50. This might mean that there should in fact be a ranking of Egos based not on the number of ties, but the impact of those ties, as weighted by their alter's number of connections (a kind of impact factor). Where Ego has ties with alters that have several 500+ connections, that Ego's network is of higher value than another's, even if they have a fewer total number of ties.

6. Conclusion

The dissertation is interested in investigating the relationship between informal networks and firm performance in healthcare. It remains to be seen whether online professional networking sites such as LinkedIn, can provide a clue about variation in country-level innovation performance; namely, the contribution of the composition of informal networks themselves. Thus far it appears that, in light of the hypotheses, that LinkedIn is a severely "western" oriented information and communications technology, such that one might not be able to say, which came first, the international linkages or the invention. It does appear, at least initially, that there may be an overrepresentation of "friends" from former places of study, rather than arm's length contacts in the Hungarian case. This is indeed very interesting given that Hungarian users of LinkedIn must be very outward looking, but still their networks contain mostly Hungarian "friends". However, further data is needed as well as country comparison in order to both confirm this speculation and try to more deeply probe informal network composition as a determinant of firm performance in Hungary.

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14. Role of Technology Transfer Offices in University-Industry Interactions

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University and industry relations have been developed since the past few decades in several ways. In knowledge based economy these two parties need to work together in order to implement the successful commercialization of research results. For industry, in long term, it is a cost-efficient opportunity to get the newest knowledge and the best solutions for their technological problems. Universities need to find their positions on the global intellectual property and research and development service market. Therefore in developed countries universities have established organizations in order to commercialize the knowledge generated at university level, to keep the existing or to get new contacts and to join networks. The evolution of this kind of inter- or outer organizations can differ in the sense of scientific profiles or geographical positions of universities, so it is necessary to examine the major patterns and the differences of their mechanisms and strategies of commercialization.

This paper[1] *aims to investigate the key forms of business-academia interactions and to position and highlight the role of university technology transfer offices in the different types of relationships with the industry, using the main literature findings and national and international examples. The paper also aims to present how these offices can contribute to commercialization process of knowledge generated by universities, what are the motives of industrial involvement, and what services can be provided for inquiries coming from the parent university or outside.*

Keywords: universities, technology transfer offices, business-academia interactions

1. Introduction

Universities and industrial partners are playing important role in technology intensive industries. The successful research and development and innovation processes cannot be implemented without these organizations. To understand the position of technology transfer offices in the university industry collaborations we need to discuss these three actors of this field.

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In the first part of the paper we present the general characteristics of industrial partners and the universities collected by empirical sources. Section 2 considers a few theoretical backgrounds of university industry collaborations. In third part we describe the models of technology transfer offices focusing on their position in universities and the financing sources. Then we introduce the case of University of Szeged presenting briefly the current results of technology transfer.

2. Characteristics of industrial partners and universities

According to their operation the one of the greatest challenges of industrial partners are the time and the permanent need for quick market responses. Drug development or other industries can be different, because of the long term development ineludible flows, but a good example for this can be the mobile phone market or any other IT related technologies.

With a late introduction of a new technology achievement, a market leader can be also failed and it can lose their first position. A wrong estimation of market opportunities for a possible new product line and a late recognition of new market potential can also harm the position in ranking at global market as well. It means that the proper timing of innovative product introduction is also crucial task for a usually innovative company, and it assumes a proper timing of the research and development. In some cases companies cannot afford a long term research and development (R&D) process if their competitors attack their standings. This can enhance the need for collaboration with universities or public research organizations (PROs). Using university knowledge for a concrete technical problem solving, can save time for industry too. This can be implemented by licensing-outs or joint research programs as well. During the cooperation industry and universities can concentrate on their core activities at the same time. Companies can prepare to produce, to market and to sell their new products, universities can use their knowledge and get money for it or for actual and future other costs.

Mostly at small and medium enterprises (SMEs) a general character is the insufficient research and development resources too. Not even all big companies have the all special, usually very expensive, equipment for e.g. a specific measurement or analysis. There are several examples for the other direction too. Sometimes universities cannot afford to invest in a big device, so they have to find some industrial partner to cooperate with in order to carry the specific scientific project out.

Without connection to the other part, the lack of R&D equipment can be a major market disadvantage for a company or for a university. The insufficient human resources for

innovation are also great challenge mostly in industry however it is not so relevant in big companies, because of the better wages and career offers. For SMEs, to maintain and to finance a research group is not the most cost effective solution and mainly they cannot employ the best experts due to the big companies better opportunities offered to them. To tackle with this problem the good terms with university can be an answer. Companies can hire universities to deliver the results what they need, without paying attention to purchasing or operating the physical or the human resources presence.

In contrast with industry, universities execute scientific oriented works and tasks. They are relatively far from the markets, so their interests are in general not business like. Their information of market relations is incomplete and the technical or the consumer changes of markets are not so relevant for them. The organization structure is also different from companies. The decision making process is usually slow and the size of the entire organization is bigger than the most companies, even the big companies as well.

The main focus of universities is basic research oriented, experimental development or applied research are mainly relevant only in specific industry related programs. The fundamental tasks of universities are knowledge generation – the research - and knowledge transfer – the education. The third role, the knowledge utilization is the next step in the evolution of universities that could extend the collaboration opportunities with the industry. This activity is based on the concept of entrepreneurial university.

Marketable knowledge produced by universities as output showed up first time in Etzkowitz (2008) many works, according to them the “entrepreneurial university” is handled one new approach of the relationship between universities and companies. The concept of “entrepreneurial university” is based on industrial co-operation so that knowledge acquired by universities - during interaction - is used to work out and apply their own business activities in business environment in order to contribute - first of all - to the regional economic and social development. This process became well-known as the third mission of universities after research and education.

According to Bajmócy (2011) the components of the third, academic mission are human resources, intellectual property, spin-off organizations and contracts with companies and individuals but in a wider sense participation in policy making, in cultural life or even in the ordinary knowledge transmission too.

Third mission of universities have started to expand at first in USA in the last few decades, later in the other more developed countries too (Bajmócy 2005). The market demand itself was not enough even in the USA since legislation background was not applied. Patent

and Trademark Amendments Act, called Bayh-Dole Act in the literature too, tried to cover this lack in 1980. It means that universities and research centers had big freedom in the possession of the intellectual properties created from the governmental financing. This decision was very important at that time which gave new momentum for the American economy.

3. Theoretical background of university industry relationships

According to Blum and Müller (2004) categories the differentiation for cooperation can be done by the directions. The first group is connected to the horizontal cooperation. In this case the task distribution and the task implementation is done jointly by the availability of resources for R&D&I. In this case the ownership of intellectual property rights are collective. The second option is the vertical cooperation, when the relation is divided into two separate parts, to customer and to service provider part. The customer, mostly the industrial partner pays the charges of research and development to the service provider, university partner. The vertical cooperation allows customers to be entitled to be the owner of the intellectual property rights created.

Fontana and his co-authors (2006) highlighted that the university industry collaborations are analyzed by the impacts of scientific results to the economy, derived from turnovers, research and development activities and patenting activities of companies. They also (Fontana et al 2003) investigated the interactions by the universities' and other public financed organizations' point of view by the particular roles in the implementation of innovation and idea transformation activities. Other selection criteria are the forms of the channels used for cooperation, because universities and the industrial partners can work with each other by formal or informal channels as well.

Varga (2004) created four options for knowledge transfer mechanisms to companies, started from universities. Knowledge transfer, as a form of university industry collaboration, can be distributed by the knowledge flows, the knowledge transfer by networks, the formalized knowledge diffusion and the knowledge transfer using physical facilities of universities by industry.

Inzelt (2004) grouped the interactions by the actors. The three main levels are the cooperation by individuals, cooperation by individuals and institutions and cooperation by institutions (Figure 1).

Table 1 Types of interaction

Between individuals	Between individuals and institutions	Between institutions
1. Ad hoc consultations of firm employees at universities	5. Buying university research results (patents) ad hoc basis	12. Access to special equipment of firm/university with or without assistance of owner's organizations
2. Lectures of firm employees held at universities	6. Employing faculty members as regular consultants	13. Invest into university's facilitates
3. Lectures of faculty members held at firms	7. Coaching of firm employees by university researchers	14. Regular acquiring university research
4. Regular (informal) discussions between faculty members and firm employees on the meetings of professional associations, at conferences, and seminars	8. Training of firm employees by university professors	15. Formal R&D co-operations such as contract research
	9. Joint publications by university professors and firm employees	16. Formal R&D co-operations such as joint research projects
	10. Joint supervision of Ph.D. and master theses by university and firm members	17. Knowledge flows through permanent or temporary mobility from universities to firms
	11. Joint IPRs by university professors and firm employees Arm's length	18. Knowledge flows through spin-off formations of new enterprises

Source: Inzelt (2004)

The university industry collaborations can be advantageous for industry because in short term they can get the latest knowledge and the solution for their specific technical or technological problem, in mid-term they can be allowed to use and exploit the human and technical infrastructure of universities, including the selection of new employees from graduates. In long term they can position themselves as knowledge oriented company at level of researchers, students and even competitors. Companies can also establish a long term cooperation and stable professional, scientific background for future innovation and product or technology development smaller or bigger plans, like research centers or company departments at universities.

For universities there are two main benefits of cooperation. The first and most important benefit is the involvement new, state-independent and in some cases significant financial resources. The second is the competitive advantage in the competition for new industrial partners and for students.

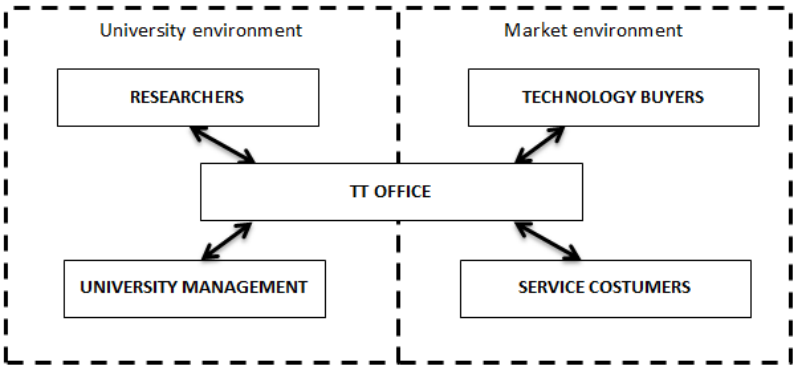
4. University technology transfer office models

The academic knowledge utilization activities are based on the co-operation particularly with the industrial partners which can be grouped in many ways (Etzkowitz 2008). The levels of the university-industry co-operations have different evolution phases. One of them is Technology Transfer Office (TTO). The creation of Technology Transfer (TT) is not necessarily the first step to utilize the created knowledge. This level places between many other stages like the establishment of industrial liaison office or incubators.

According to the Organisation for Economic Co-operation and Development definition the TT office in the university or research center or an institute which has tasks as identification and management of academic intellectual property (IP), IP protection, IP commercialization and license contracts (OECD 2011). Besides them main task is the creation and management of spin-off organizations and contact keeping with the partners.

TT offices can be identified as an extended hand of to the industrial actors in order to solve the important technical and scientific problems raised by the industry side. Furthermore it is a bridge between the academic management and academic researchers as well (Figure 1).

Figure 1 The direct environment of university technology transfer offices



Source: author's own construction

Literature highlights three different basic forms or types of TTOs according to the role and position of them in their organization (OECD 2002, 2011):

1. The first and the most usual case when the TT office works in the organization as a department. This "Department-type" model gives financial and management advantages for the universities, especially in case of a new TT office. When the own technology portfolio is small can finance themselves and in many cases the office can handle

additional tasks too. In this model technology managers and researchers can be closer to each other in time and in localization too.

2. The second opportunity, if the office works as internal department of the university. This is useful if the university cannot guarantee the financial and human resources. This model is cost effective for universities since it does not maintain organizational infrastructure which means fix costs. But the TT office is a bit further from the researchers so the in-house contacting is harder in this "Wholly owned subsidiary" model.
3. In the third opportunity, the university can hire an independent organization. In the case of this "independent" model the university can have resort to the professional technology transfer service which costs can be higher in many cases, especially after a successful business transaction. Their advantages are the know-how and high effectiveness, mainly if the university's product portfolio includes just few marketable components.

According to Young (2007) overview there are some international examples for technology transfer models and the forms of financing. In Australia the PROs organized TTOs by the „Wholly owned subsidiary" model and they can finance their operations without involvement of other financial resources. In India the organization of TTOs is not in formal frameworks. Most universities have established some offices, but they had to use their own financing resources for implementation of tasks.

From a 1998 legislation, the TT offices can be operated in Japan. This act provides an opportunity for Universities to finance the two-third of the costs of the offices in the first five years. The Chinese universities run TTOs in the wholly owned model with external services providing. Besides the main technology transfer activities the private companies are active costumers of them, so the financing is secured in general. The most common services are business planning, spin-off management consultancy, incubation and business planning.

In United Kingdom state supporting schemes were introduced in last century in order to enhance collaboration between the university and industry. The most attractive example of the British TTOs is the ISIS Innovation Ltd. that is an outsourced company of Oxford University. The company is one of the most emerged University technology transfer organizations. Through its three basic pillars, the Isis Technology Transfer, Oxford University Consulting and Isis Enterprise, they offer a wide range of services for non-profit and profit oriented organizations. Young also highlights that the most University in United Kingdom run a

department-type organizations as well. Their tasks are mainly in connection with administration, contacting and connecting with new partnerships.

As mentioned earlier the Bayh-Dole Act was the key element to start the official way of university technology transfer in the United States. According to this law, the income structure of the TT activities has to cover the administration costs of the offices, the financial revenues of the inventors also.

In Hungary the introduction of the acts on Higher Education, the Research and Development and Technological Innovation and the Research and Technological Innovation Fund in 2002-2005 enabled the legal framework for official technology transfer initiatives as well, including the financial resources, the opportunity of the company establishment of universities or the EU harmonized definition of research and development activities (Inzelt 2008).

5. Case of University of Szeged

University of Szeged was pinned on the global map of science, when Albert Szent-Györgyi, the head of the Faculty of Biological Chemistry, won the Nobel Prize for discovery of vitamin C in 1937 (SZTE 2012). Now University of Szeged is one of the largest universities of Hungary. The average number of students is 25,000 with 700 additional students on PhD doctoral schools. The University has 12 faculties, including medical and pharmaceutical sciences, ICT, natural sciences (chemistry, biology, physics, environment) and economics. University of Szeged is the biggest employer of the region with 7,000 employees. The University offers 88 BA and BSc, 117 MA and MSc majors, 4 undivided degree courses, 59 postgraduate and complementary training courses.

According to the 2011 statistical data University of Szeged 291 researchers and the 2.239 instructors; 21 of them are full members of the Hungarian Academy of Sciences (HAS) and 114 are corresponding members, and 643 are Doctors of Philosophy (SZTE 2012).
In recent time 20 joint cooperation research teams operate at 4 faculties of the University, 12 of which are financed by the Hungarian Academy of Science. The average annual number of publications is more than 10,000 (SZTE 2012).

At this time the research and development and innovation activities placed under the vice-rector (SZTE 2012). The Vice-rector manages The Directorate of R&D and Innovation, which works as an interface between the academic community at Szeged and external collaborators in both the public and private sectors. The Directorate has four parts, the

R&D&I secretary, the Industrial Liaison Office, the R&D project management office and the Technology Transfer Office. The basic task of the TTO is the managing and extending the university intellectual property portfolio. This part of the directorate handles the university knowledge map, prepares the intellectual property applications, analyses the market potentials of the inventions, creates business concepts and executes the possible partner search. The TTO coordinates the innovation services for external partners and the international technology transfer cooperation as well. Using the own professional knowledge of its faculties, the Directorate also employs a legal expert and marketing experts in order to help the commercialization and partnership building processes in the field of technology transfer.

The University of Szeged started its new technology transfer program in 2009 by a joint implementation with College of Kecskemét. The nearly 2 million EUR project was partly financed by European structural and Hungarian governmental funds.

As the result of this project and the earlier efforts the patent portfolio of the University consists of more than 40 patents, many of which have already been commercialized through license agreements and spin-off enterprises established especially in the field of medical, pharmaceutical, environmental sciences and ICT. In 2012, University of Szeged has seven spin-off companies (SZTE 2012).

Table 2 Income structure of utilization of research results at University of Szeged 2006-2011

	2006	2007	2008	2009	2010	2011
Income generated by utilization of R&D results (in EUR, EUR/HUF=290)	10,362,459	12,119,962	14,492,997	15,899,614	11,254,348	8,334,486
in % of types of activities						
joint research	78.3	86.91	81.91	65.41	68.68	75.9
licensing out	0.05	0.03	0.01	0.25	0.47	0.09
contract research	21.65	13.06	18.08	34.34	30.85	24.01

Source: SZTE (2012)

6. Conclusion

Several factors are available for the cooperation by universities and the industrial partners. The first but not the most important factor can be the high level of interdependency. Industry has the financial sources for R&D, but the knowledge for it at the university side. In some cases the cooperation is started by a top-down initiative, which is important if it is paired with financial support. Direct or indirect governmental supporting schemes can provide joint projects implemented by both parties, or a voucher system can be also a good tool for the

enhancement of collaboration. Other reasons for collaboration is the risk sharing, cost and time saving at both sides. University and industry R&D and innovation (R&D&I) processes are overlap each other so there are few steps that far from the core activity of the actors. This option induces the optimization of resources as an additional motivation and job keeping and job creating opportunities mostly on the university side.

As universities and the industry are on competition in their market, so image improvement is also a key element for collaboration. Industries can boost the sales figures if a new product is branded as a result of a joint research with a famous or acknowledged research organization. In case of getting new students universities can gain market advantage if they have a number of industry related connections. They can be more attractive for applicant students than others who offer less marketable curriculum and degrees mostly in natural, technical, medical and agricultural sciences.

In reality, the combinations of TTO models exist since the universities use mixed models because they take into account the advantages, contact system, prepared human resources, utilization purposes, etc. The evolution of the models can come from two directions:

1. The universities which have bigger technology portfolios which include a lot of marketable technological and intellectual products should start with the first model and then go to the direction of the second model.
2. The universities which have smaller portfolio should start with the independent organization as first step and then go to the first model and the second model can follow it.

For the universities the second model can be the most effective. But the main criteria of the selection can be the availability of the human resources, contact system, number of technologies in portfolio and their possible business potential. The involvement of technology transfer offices at the development of university industry cooperation can be different in each university, it is an issue of the decision of university management. It is a matter of commitments and missions made by university in case of utilization of research results generated at its sites.

University of Szeged has made the first steps in order to become a successful technology transfer actor. At this time the TT activities are implemented in the framework of the department-type TTO model. The first financial inputs have established a stable fundament. In the next few years a future research can investigate and measures its

effectiveness and make comparisons with other Hungarian and international Universities, who have mostly the same geographical, economical or scientific background and environment.

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15. Evidence on Knowledge-intensive Industries in the Regional Innovation System of the Southern Great Plain

Zsófia Vas

Aalborg school of innovation systems highlights the complementary nature of different approaches. Literature reveals the impact of the components of regional innovation systems on clusters, promote clusters in which industrial firms can reach higher innovation performance and reveal the interaction between sectors and the national innovation system.

Innovation performance in sectoral innovation systems depends on the nature of the industry and determined by its geographical location. However, it is not the most obvious to investigate the geography of sectoral innovation systems primary in national borders, since they are often localized, concentrated on subnational level, and influenced by regional innovation systems. The problem is the lack of empirical evidence on the mutual impact of sectors and regions. The relationship is even less examined in less developed regions.

This study[1] *is designed to examine the interaction of sectoral and regional innovation systems, and reveals the characteristics of sectors and regions in case of knowledge-intensive industries in the Southern Great Plain Region of Hungary. The questionnaire based survey shows the relevant organizations in innovation activities, their heterogeneity, geographical location and the diversity of links in innovation and R&D activities.*

Keywords: knowledge-intensive industries, regional and sectoral innovation system, less developed region

1. Introduction

As a result of the expansion of knowledge-based economy and the global economic activities higher attention is drawn to identify all the determinants, which contribute to the increase of competitiveness and the specialization of economic actors and regions. There are several factors, which explain the difference between developed and less developed regions, and one of them is the difference in innovation capacity, which can lead to differences in the innovation performance as well. The literature of innovation systems provide a suitable framework to analyze innovation processes both at regional and sectoral level and to reveal all the elements and interactions, which are essential for the production, diffusion and use of

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knowledge. The concept of innovation systems puts a great emphasis on the social context of innovation activities and the interactive nature of learning. According to the conceptual framework of regional innovation systems (RIS), the interactive learning takes place in two subsystems, in the knowledge application and exploitation subsystem, and in the knowledge generation and diffusion subsystem. The knowledge application and exploitation subsystem consists of firms forming regional clusters and also their support industries.

All industries produce and use new knowledge and technology, but industries with analytical or with the combination of analytical and synthetic knowledge base are more knowledge or technology-intensive. Knowledge-intensive industries have attracted a great attention in knowledge application and exploration. They generate positive effect on the regional economy, and can have a leading role in the development even of less developed regions. Due to their nature as special kind of sectoral innovation systems (SIS), knowledge and innovation activities in knowledge-intensive industries are generally spatially bounded. For this reason if firms in an industry are geographically concentrated in a region, economic conditions of the particular region have an impact on the industry, even if it is a knowledge-intensive one.

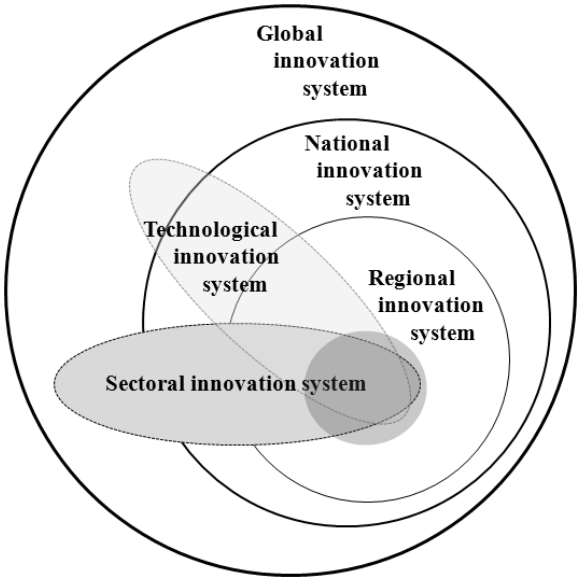
Recent study attempts to answer the following research question: how innovation activities of knowledge-intensive industries can be characterized in the less developed NUTS2 region of Southern Great Plain in Hungary? The questionnaire-based research highlights the specificity of knowledge-intensive innovation activities, the nature of cooperation the intensity of R&D activities, and the barriers of innovation. The questionnaire is based on the Community Innovation Survey, and completed with question from the innovation system literature and with general information on companies. The study shows the basic concept and some elements of the ongoing PhD work.

2. Theoretical introduction - Interdependence of regional and sectoral innovation systems

Innovation system approach has emerged since its initial appearance with the concept of national innovation system (Freeman 1995, Lundvall 1992, Nelson 1993) and has extended with the notion of regional (Cooke et al. 1997), sectoral (Malerba 2002) and technological (Carlsson – Stankiewitz 1991) innovation systems. The approach of innovation systems provides understanding on the interactive and collective process of innovation, and describes the role of the variety of actors, information, knowledge, interactions and complementarities among agents involved in the process of innovation.

The literature on sectoral innovation system (SIS) explores the characteristics of the change and transformation of sectors, also the actors, links and interdependencies within and even between sectors (Malerba − Orsenigo 1997, Malerba 2002, 2004). It makes a combination of several perspectives to analyze sectors, and dissolves the limitations of case studies and industrial economics. The approach puts an emphasis on the study of the role of non-firm organizations and the transformation of sectors in their boundaries too, and emphasizes the importance of knowledge and interactive learning. The theory highlights that knowledge is a key asset for competing firms, and learning is a key process to strengthen competitiveness.

Figure 1 Relation between different approaches of innovation systems



Source: author's own construction based on Asheim and his co-authors (2011, p. 884.)

Based on the sectoral knowledge base Asheim and Coenen (2005), Baba and his co-authors (2009), Tödtling, Lehner and Trippl (2006) distinguish two main types of knowledge base: the *analytical* and *synthetic knowledge base*. The latter one is more likely concerned to the traditional industries, but analytical knowledge base, or the combination of analytical and synthetic knowledge base is typical to those knowledge-intensive industries, like ICT.

Innovation performance of firms depends upon the characteristics of the sector and closely related to geography. Research on innovation systems related to sectors (Breschi – Malerba 2005) demonstrate that SISs may be highly localized, and go under the impact of regional economic conditions. Innovation processes of firms are rooted in specific contexts with particular inputs, knowledge base, competences, institutional background and demand relevant to sectors, and localized on different territorial levels. While mode of sectors to innovate defines

the innovation pattern and economic performance of a region, meantime national, regional and even sub-regional conditions have impact on the sectoral pattern of innovation too.

It has been pointed out (Lundvall et al. 2002) and detailed (Casper – Soskice 2004) how interdependent relationship of sectors and national system exist. It is often examined how sectors explore clustering from the viewpoint of regional innovation systems (Cooke 1997, Asheim – Coenen 2005) or how firms in regional clusters reveal better innovation performance (Porter 2000, Beaudry – Breschi 2003). But it is less discussed how the interaction forms between regional and sectoral innovation system. There is also a lack to define less developed regions in terms of innovation.

3. Regional economic conditions in less developed regions

Special focus is given to less developed regions in the research. Hence there is no universally accepted definition for less developed regions (LDRs), for the further conceptualization of regional and sectoral innovation systems and to analyze knowledge-intensive economic activities, there is a need to make our own definition of LDRs.

Firstly, a precise definition of *regions* in terms of innovation from Cooke and Schienstock (2000, p. 273.) can be followed, regions are "*geographically-defined administratively-supported arrangement of innovative networks and institutions that interact heavily with innovative outputs of regional forms on a regular basis*". This definition is in harmony with the concept of functional (nodal) regions, defined by Malecki in 1997. The own definition and characterization of LDRs for the given purpose of this paper follows the concept of Cooke and Schienstock (2000) with the combination of other studies listing special features of regions.

Regions have increasingly have become a focus of economic policy. European Union on the field of economic and social cohesion, defines a circle of so called less prosperous regions, in relation with Objective 1. The objective lists the most common economic signals of *less prosperous regions*[2]. This is the first concept, which contributes to identify less developed regions, even if this definition was made for special policy issues. The most important economic signals of these regions are the low level of investment, the higher than average unemployment rate, the lack of services for business and individuals and the poor basic infrastructure.

Following the description of the article of Tödtling and Trippl (2005) less developed regions may be related to *peripheral regions*. Tödtling and Trippl (2005) identify peripheral regions with missing clustering efforts, SME dominance, low level of R&D, low or medium

[2]Source: ec.europe.eu/regional_policy/objective1

level educated workforce, lack of specialized services and thin institutional structure. In addition, Lagendijk and Lorentzen (2007) label peripheral regions as *"non-core" areas*, located outside the principal metropolitan areas without a sector being a leader in technological development, and with greater distance to sources of knowledge generation and transfer. This concept of peripheral regions has a limitation, namely that they are often concerned as those, which have too few firms in the same industrial sector or local production system, which would lead to regional cluster formation.

Also the classification of Asheim and Isaksen (2002) of three types of RIS (territorially embedded regional innovation networks, regional networked innovation systems, regionalized national innovation system) may give a guideline to name the factors that make a region to be less developed. This concept was applied in the research of Andersson and Karlsson (2004) too, to explore the differential features of small and medium-sized regions. The concept of *territorially embedded regional innovation networks* would be in harmony with the concept of less developed region, but partly. In territorially embedded regional innovation networks both geographical and relational proximity plays a crucial role in firms' (mainly SMEs) innovative activities. The competitive advantages of firms based on a localized learning process. The probability for radical innovation is low due to the lack of knowledge providers in the region. There is also a danger of lock-in in these regions, if the networks are not able to sustain firms' competitiveness in the region. The suggestion for these regions is to build external linkages.

LDRs also may be partly identified as *regional networked innovation systems*. The basic features of the networks are same like in case of territorially embedded regional innovation networks, but it is more systemic and organized (Asheim – Isaksen 2002). These regions have stronger regional infrastructure, with more local organization (R&D institutions, training organizations etc.). Local and regional knowledge providers give firms access to information and competences, and increase the collective innovative capacity and counteract a lock in situation. To describe a less developed region the combination of the territorially embedded and regional networked innovation system may be suitable.

Finally, Rosenfeld (2002) discuss clustering efforts in *less favoured regions* with special features like, weak infrastructure, lack of access to capital, technology, innovation, regional isolation, low educational level and low skilled workforce, mature or hierarchical industry structure.

The own definition would be related to the observation of Asheim and Isaksen (2002) on territorially embedded regional innovation networks, regional networked innovation systems, Tödtling and Trippl (2005) or Lagendijk and Lorentzen (2007) on peripheral regions, Rosenfeld (2002) on less favoured regions and the definition of Cooke and Schienstock (2000) on regions

in term of innovation and based on other observed characteristics. LDRs are defined through the following characteristics in a wider sense related to economic activities. LDRs have:

- dominance of small and medium-sized (SME) enterprises,
- low level of investment
- presence of traditional industries and increasing role of knowledge-intensive sectors,
- low level of R&D activities and business services
- lack of networking and clustering efforts from a bottom-up perspective.

Additionally, from the viewpoint of the institutional background and the factors, which explicitly affect the fundamental innovation activities and the networking of the primary actors (the firms) in sectors, LDRs have:

- strong geographical, weak relational proximity among agents,
- lack of sources of qualified human capital,
- lack of knowledge and financial sources,
- like the low number of knowledge providers (university, research center, technology transfer institutions etc.).

The definition emphasizes the role of those secondary actors from the institutional background influencing the behaviour and innovativeness of firms, which are closely related to knowledge generation, utilization and transfer.

4. Evidence on the innovation activities of knowledge-intensive industries

The fundamental goal of the survey is to study knowledge-intensive industrial sector activities and the factors determining their innovation activities in such a less developed region as the South Great Plain Region is. Our purpose is to reveal all the factors affecting the introduction and spreading of innovation. Regardless of which aspect the factors influencing the innovation process are studied (regional or sectoral), basic constituents like organizations, institutions, relationships, and infrastructure are analyzed. The goal of the questionnaire is to estimate the heterogeneity, geographical location, and the diversity of relationships within organizations relevant to the innovation activities in the knowledge-intensive industrial sector, determining the learning opportunities of the corporations. The questionnaire includes certain other elements of innovation systems, like infrastructure or institutions (e.g. local governments,

development agencies), but for their complete analysis more than corporate questioning would be appropriate and necessary.

To analyze knowledge-intensive sectors, we follow the OECD classification. Recently based on the technological standard of sectors - there are *high-technology, medium-high-technology manufacturing sectors* and *knowledge-intensive services* (KISs) (OECD 2001, Eurostat 2009). The circle of KISs is divided to knowledge-intensive market services and knowledge-intensive financial services, and the classification also makes distinction between high-tech KISs and other KISs. The latter refers to less knowledge-intensive industries, only exploiting the knowledge of other economic activities and qualified labour force. That is why enterprises providing less knowledge-intensive services as their main activity were excluded from the survey.

Micro, small and medium-sized enterprises having more than 1 employee (including the owners participating in the management), established before 01 January 2009 and having at least two completed business years were included in the study. 400 enterprises were included in the sample. The enterprises' seats on the territory of the counties of Békés, Csongrád or Bács-kiskun. The surveyed knowledge-intensive firms take the 4.5% of all knowledge-intensive industries located in the Great Plain Region.

Most of the knowledge-intensive (83.8%) and of the innovative knowledge-intensive industries (72.4%) are microenterprises, and there is relatively higher proportion of small enterprises (11.8% and 22.0%). Only 4.5% and 5.5% is medium-sized enterprises from the knowledge-intensive and innovative enterprises.

However, the number of companies that could be considered active in innovation is somewhat smaller than 400. There are 44 enterprises (including 21 innovative one) which are considered to be knowledge-intensive based on their registered main economic activity, but have become excluded. This happened because their major sources of revenue were non-knowledge-intensive activities. Thus, we are able to come to a conclusion on innovative activities in the based on the answers of 127 enterprises. Out of 400 enterprises 31.8% implemented innovations in the last 3 years. In the course of the study we are going to consider these companies as *innovative knowledge-intensive enterprises*. In the specification of the type of innovation we followed the definition of Oslo Manual (OECD 2005).

Among the 400 knowledge-intensive industries 15.5% is manufacturing companies, of which 13 companies are high-tech manufacturing company (Table 1) Almost half of the manufacturing enterprises are also innovative ones. Among knowledge-intensive and even among innovative knowledge-intensive enterprises the knowledge-intensive services are in the

majority. 74.2% of all enterprises are business service company, including 97 innovative one. This means that out of the 127 innovative companies, 66.0% provides services, and these are mainly knowledge-intensive market and high-tech services.

Table 1 Knowledge-intensive (and) innovative enterprises (according to main activity and activity providing the major revenue source)

		NACE Rev. 2.	Knowledge-intensive SMEs (n=400)		Innovative knowledge-intensive SMEs (n=127)	
			Number	%	Number	%
High-tech manufacturing industries		21	1	0.3	-	-
		26	12	3.0	4	2.7
Medium-high-tech manufacturing industries		20	7	1.8	3	2.00
		27	5	1.3	3	2.00
		28	21	5.3	12	8.1
		29	13	3.3	7	4.7
		30	2	0.5	1	0.7
All			61	15.5	30	20.2
Knowledge-intensive services	**High-tech knowledge-intensive services**	59	3	0.8	1	0.7
		60	1	0.3	1	0.7
		61	5	1.3	2	1.4
		62	18	4.5	8	5.5
		63	2	0.5	1	0.7
		72	27	6.8	15	10.1
	Knowledge-intensive market services	50	4	1.0	1	0.7
		51	2	0.5	1	0.7
		69	64	16.0	11	7.4
		70	19	4.8	4	2.7
		71	66	16.5	18	12.2
		73	10	2.5	7	4.7
		74	25	6.3	8	5.5
		78	3	0.8	2	1.4
		80	15	3.8	8	5.5
	Knowledge-intensive financial services	64	2	0.5	2	1.4
		65	3	0.8	-	-
		66	26	6.5	7	4.7
All			295	74.2	97	66.0
		All	**356**	**89.7**	**127**	**86.2**

Source: author's own construction

The survey shows that businesses implemented *product and / or process innovation* over the past three years, and it was new in the business or for the market (Table 2). Knowledge-intensive businesses mostly introduced new or significantly improved goods (38.6%) or new services (29%) for the market. Typically, companies tended to carry out service innovation, which was new not only to the business but also to the market, and this refers to product innovation as well as to process innovation.

Table 2 Product and process innovation of innovative knowledge-intensive businesses

Type of innovation activity	Yes. which is new to the market		Yes. which is new to the business		No	
	Number	%	Number	%	Number	%
Introduced new or significantly improved product (good) (n=126)	49	38.6	26	20.5	51	40.2
Introduction of new or significantly improved service (n=126)	38	29.9	36	28.3	52	40.9
Introduction of new or significantly improved process for producing or supplying goods or services (n=124)	32	25.2	27	21.3	65	51.2

Source: author's own construction

The questionnaire also focused on activities related *to organizational or marketing innovation*. Among the answers to did your business conduct any marketing or organizational innovation activities during in the past 3 years, the proportion of "no" answer is higher than it was in case of product and process innovation (Table 3).

Table 3 Organizational and marketing innovation of innovative knowledge-intensive businesses

Types of innovation activities	Yes		No	
	Number	%	Number	%
Implementation of new or significantly changed corporate strategy (n=127)	36	28.3	91	71.7
Implementation of new management techniques within this business (e.g. new supplier technique - Just in Time system) (n=127)	31	24.4	96	75.6
Implementation of major changes to your organization structure(e.g. cross-site. teamwork) (n=127)	44	34.6	83	65.4
Implementation of changes to marketing concepts or strategies (n=127)	54	42.5	83	65.4

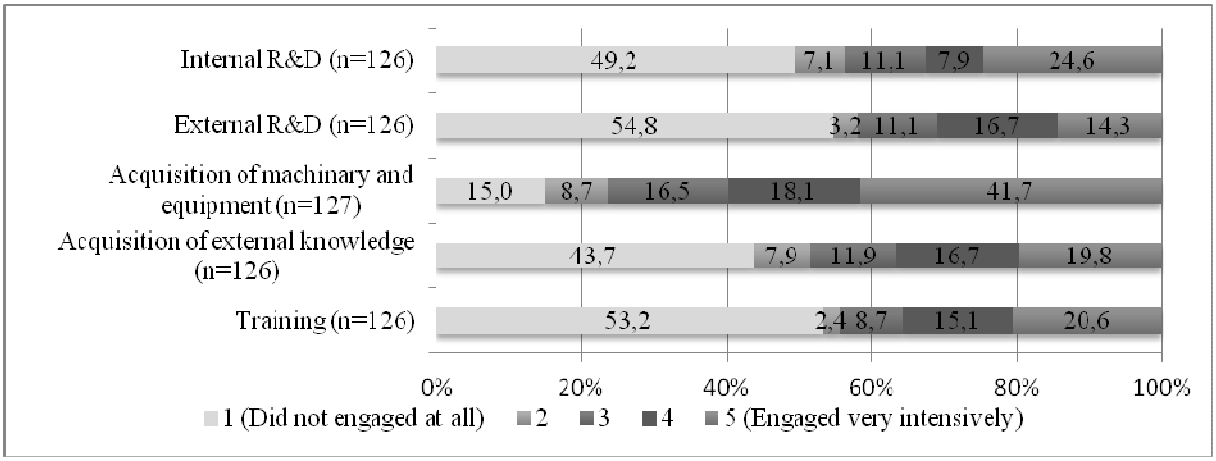
Source: author's own construction

If we look at organizational innovation, we can see that only 28.3% of the innovative knowledge-intensive companies implemented new or significantly modified organizational strategies. New business practices were used by almost 24.4% of the companies. More than one third of the innovative companies (34.6%) introduced changes related to their organization structure and 42.5% of them used new marketing concepts and strategies.

The questionnaire also included a question asking whether (and if yes, how intensively) the business engaged in the following innovation related activities in the past 3 years: research and development, acquisition of equipment, acquisition of external knowledge or training. Knowledge-intensive companies marked the intensity of the listed activities on a five-grade scale.

49.2% of innovative companies did not engage in any *internal R&D*, and the same goes for 54.8% them in relation to external R&D (Figure 2). In contrast, in the past three years a number of companies were intensively engaged with internal R&D (24.6%) and *external R&D* (14.3%). The average is 2.52 for internal R&D and 2.33 for external R&D. The most heterogeneous group of firms relates to internal R&D and training (standard deviation is 1.70). In other words, even if companies can be defined as innovative, in almost 50% of the cases they introduce new solutions without R&D activities.

Figure 2 The extent of activities needed for innovation



Source: author's own construction

In order to carry out innovative activities, the acquisition of machinery, equipment and software, i.e. of developed technology, machines, computer hardware and software. The average of answers given to this question is 3.63. 41.7% claimed that these are strongly related to their innovative activities. We cannot state the same about the acquisition of external knowledge (the mean is 2.61) or about the necessity of training (the mean is 2.48). *Acquisition of external knowledge* basically refers to acquisition or licensing of patented and non-patented inventions, know-how and other knowledge from other companies. 43.7% of companies did not need external knowledge at all, while more than 40% of them acquire external knowledge more intensively than the average, so that they could carry out innovative activities. The tendency is the same for innovation-related *training*, in case of internal or external training of experts (the training serving specifically the development or introduction of innovation). Employees did not participate in any training at half of the companies (53.2%).

Through innovation knowledge-intensive companies might be present at the knowledge market with products protected by *intellectual property*. Table 4 summarizes the answers given

to the question "During its operation, did your business apply for a patient, register an industrial design or trademark or produce materials eligible for copyright?".

Table 4 Intellectual property of innovative knowledge-intensive companies

Form of intellectual property	Yes		No	
	Number	%	Number	%
Did you apply for a patent? (n=127)	12	9.4	115	90.6
Did you register an industrial design? (n=127)	4	3.1	123	96.9
Did you register a trademark? (n=127)	7	5.5	120	94.5
Did you produce intellectual products eligible for copyright? (n=126)	38	30.2	88	69.8

Source: author's own construction

Because gaining copyright is a typically complex and costly process, small and medium enterprises did not apply for a patent (90.6%), register an industrial design (96.9%) or register a trademark (94.5%). On the other hand, 30.2% of innovative knowledge-intensive companies produced such intellectual products which are under copyright. 9.4% of the companies applied for a patent in the past three years.

Table 5 shows the answers to the question "How important were the following factors in the decision making to innovate during the last 3 years?". The factors listed in the table were evaluated by the companies on a five-grade scale, from "not important at all" (1) to "very important" (5).

Table 5 Objectives and importance of innovative activities

Factors	Importance ranking	Mean	Standard deviation
Improving quality of goods or services	7.11	4.32	1.05
Increase range or goods or services	5.97	3.85	1.27
Increasing capacity. efficiency for producing goods or services	5.97	3.81	1.29
Meeting regulatory requirements	5.94	3.75	1.53
Entering new markets	5.75	3.71	1.44
Increasing market share	5.70	3.71	1.42
Replacing outdated products and processes	5.58	3.57	1.48
Reducing costs per unit produced or provided	4.64	3.13	1.57
Have environment friendly products. processes	4.28	2.95	1.59
Improving health and safety	4.05	3.00	1.49

Source: author's own construction

The importance of each factor can be compared with the help of a Friedman-test. This test assigns an importance value to each objective and this value shows the average rank each of the given ten objectives gains from the respondents. A higher value shows greater importance of the

objective. Based on this you can put together a list in order of importance. The test showed that the individual factors or objectives are not equally important for innovation. “Improving the quality of goods or services” and increasing the range of the same tops the list of importance, while in the bottom of the scale we find “Improving health and safety”.

Based on the Friedman-test we conclude that the importance of reaching individual objectives does not appear to the same extent in our sample. The same is supported by the means of answers given to each option. Here the most important objective is the improvement of the quality of goods and services with a mean of 4.32. Standard deviation from the mean is the smallest in case of quality (1.05), which means that quality is important for all companies. A total of 58.3% of the companies find it exceptionally important to improve quality during its innovative activities. After quality “Increase range or goods or services” and “Increasing capacity” are of the same importance (with means 3.85 and 3.81 respectively). The least important factors are environment consciousness (mean=2.95) and health, safety was not an important reason for companies with respect to innovation.

Table 6 Geographic scope of the partnerships innovative companies have

Actors	**Relation**						**No relation**	
	Region		**Country**		**Abroad**			
	Number	%	Number	%	Number	%	Number	%
Suppliers of equipment. materials. services. or software (n=126)	28	22.2	58	46.0	16	12.7	24	19.0
Clients and customers (n=125)	24	19.2	64	51.2	9	7.2	28	22.4
Competitors or other businesses in your industry. which are								
SMEs (small and medium sized) (n=125)	22	17.6	43	34.4	5	4.0	55	43.3
Large companies (n=124)	9	7.3	29	23.4	4	3.2	82	66.1
Consultants. commercial labs or private R&D institutes (n=126)	7	5.5	27	21.3	-	-	92	72.4
Universities or other higher education institutions (n=126)	9	7.1	28	22.2	1	0.8	88	69.8
Government or public research institutes (n=126)	4	3.2	14	11.1	1	0.8	107	84.9
Innovation and technology centers. development agencies (n=126)	7	5.6	14	11.1	1	0.8	104	82.5

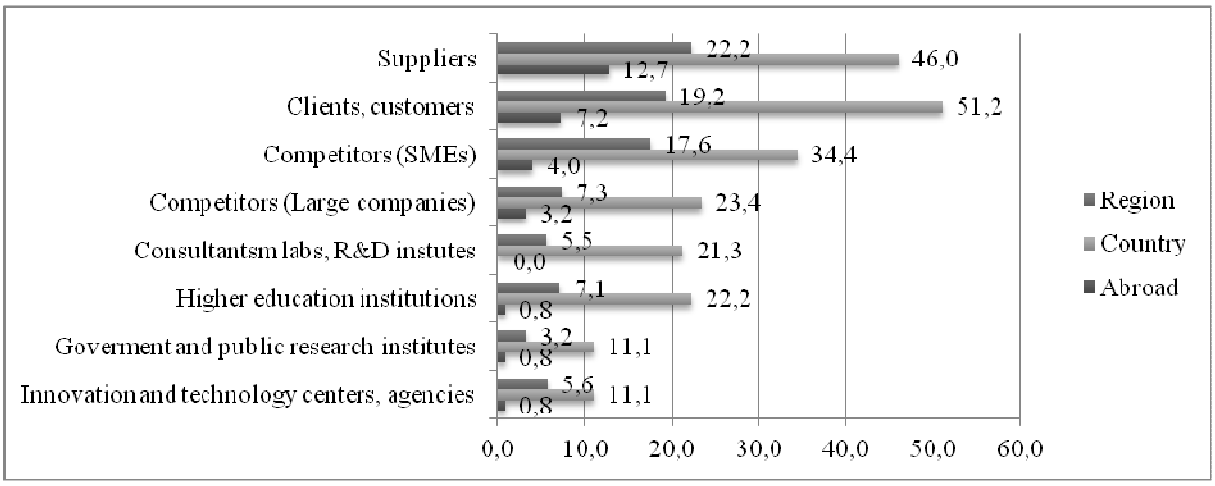
Source: author’s own construction

When investigating the group of knowledge-intensive companies, the analysis of statistical data on the most important *business actors they cooperate* with during their innovative activities and the geographic scope of their partnerships form an important part of the analysis (Table 6.).

The question arises: do these actors, which appear to form a homogenous group, they cooperate with come from the region, the country or from abroad? Partnerships can be formed with direct suppliers, clients, customers, competitors, consultants, research institutes, universities or other higher education institutions, public institutes or even with regional development agencies, which can be in the same region in which the business is located, in other part of the country and abroad.

The results clearly show that partnerships are usually not formed within the South Great Plain Region, rather outside it, countrywide (Figure 3). Knowledge-intensive businesses which are most active in innovation typically work together with clients, customers, suppliers and with competitors, mostly SMEs. The same actors dominate international partnerships as well.

Figure 3 Partnerships of innovative companies



Source: author's own construction

The majority of knowledge-intensive companies do not cooperate with higher education institutions. Partnerships with government or public research institutes are the least important, with innovation and technology centers and regional development agencies are also irrelevant, 72,4% of companies does not have any co-operation with consultants, commercial labs or private R&D institutes.

We were also curious whether there was anything to *constrain* the companies during their *innovative activities*, and if yes, to what extent (Table 6). Certain factors did not constrain innovative activities at all, while others formed major obstacles. Companies provided evaluation on a five-grade scale. We analyzed the means and standard deviations along several factors. The most important constraints to introducing innovation were the ones due to economic development(mean=3.34), to lack of finances (mean=3.08) and to high costs of innovation

(mean=3.07). Innovative companies also ranked these as significant constraints: they were mentioned by 32.0%, 24.6% and 20.6% of the companies.

Markets dominated by established businesses and uncertain demand form a less significant constraint. The least constraining factors are the ones related to technology and technical infrastructure. Based on the Friedman-test we conclude that the importance of individual constraints differs throughout the sample, but these differences are not always significant.

Table 6 Constraints and their extent in innovative activities

Factors	Importance rank	Mean	Standard deviation
Constraints due to recent economic developments (e.g. recession)	8.53	3.34	1.53
Availability or lack of finance	8.04	3.08	1.51
Direct innovation costs too high	8.00	3.07	1.45
Market dominated by established businesses	6.89	2.60	1.38
Uncertain demand for innovative goods and services	6.88	2.55	1.38
Lack of qualified personnel	6.29	2.40	1.46
EU. public or other government regulations	6.28	2.45	1.45
Organizational rigidities (internal resistance. long administrative and approval process)	5.80	2.11	1.39
Lack of financial. technical support of the local government	5.52	2.10	1.57
Lack of information on markets	5.40	2.01	1.28
Lack of (technical) infrastructure	5.37	2.00	1.10
Lack of information on technology	5.00	1.82	1.09

Source: author's own construction

Finally, it is important to look at innovative activities from the aspect of the form and source of *information necessary for introducing innovation* companies receive. This aspect is also interesting because the knowledge-intensive companies in our survey are located in a less developed region. In the questionnaire we listed various sources of information, and companies decided how important each source was for them on five-grade scale (Table 7).

The most important sources of information for activities related to innovation are clients and customers. On the one hand, 50.0% of the companies evaluated these factors as very important, and, on the other hand, companies form the most homogenous opinion along this factor (knowing that standard deviation from the mean is 1.11). Suppliers, informal relationships as well as colleagues and factors within the company are equally important. Based on the Friedman-test we conclude that the evaluation of individual sources differs.

Table 7 Importance and source of information needed for innovation

Factors	Importance rank	Mean	Standard deviation
Clients or customers	10.16	4.13	1.11
Suppliers of equipment. materials. services or software	9.13	3.82	1.30
Informal relations (family. friends. former colleagues etc.)	9.01	3.80	1.24
Colleagues. documents etc. within your business or enterprise group	8.73	3.77	1.29
Competitors or other business in the industry	7.66	3.30	1.29
Conferences. trade fairs. exhibitions	7.02	3.14	1.38
Scientific journals and trade/technical publications	6.93	3.06	1.32
Technical. industry or service standards	6.42	2.90	1.34
Professional and industry associations	6.00	2.69	1.39
Consultants. commercial banks	5.54	2.54	1.32
Universities or other higher education institutions	5.54	2.60	1.46
Regional development agencies	4.63	2.17	1.92
Government or public research institutes	4.22	2.06	1.30

Source: author's own construction

Innovative knowledge-intensive companies find that the least immportant sources of information are research institutes, but regional development agencies also qualified as unimportant sources. Data obviously show that these are not very good sources of information as 48.8% and 46.0% of the respondents marked them as "not important at all". Universities and higher education institutions are "not important at all" for 36.6% of the companies, however they are "important" and "very important" sources of information for 16.3% and 13.8% respectively.

In addition we were investigating in the clustering effort of the knowledge-intensive enterprises. As a result, we see that only 9.3% of knowledge-intensive enterprises have become part of a cluster, and out of these 37 enterprises, 19 were innovative.

5. Conclusion

Recent study attempted to reveal that the literature on innovation systems highlights that there are relation and interdependency between the different approaches of innovation systems. However there were less mentioned about the relation between knowledge-intensive sectors as certain types of sectoral innovation systems and regional innovation systems in less developed regions. This study could not go into details in connection with the characteristics of knowledge-intensive industries, but it is provided by the secondary literature. What we tried to demonstrate is the characteristics of less developed regions by pooling several concept of underdeveloped regions. Evidence on innovative knowledge-intensive industries in the Great

Plain Region revealed some aspects, which appeared in the definition of less developed regions too. We definitely can see the dominancy of micro and small enterprises in the region, which take low clustering efforts. Enterprises - probably because they are located in a less developed regions - have their relevant relations rather outside the region. The most important partners and information sources are the customers, suppliers and competitors, which results were also reflected by previous research based on CIS. Surprisingly innovative firms have less connection with universities, research institutions or agencies even they are knowledge-intensive. However it can be described by the dominancy of knowledge-intensive service providers in the sample. Clearly can be seen that innovative firms have to face constraining factors. These are not the lack of information, technology or infrastructure, but the lack of finance, the high costs and the economic recession. The study showed preliminary result of the survey, further analyses is required to reveal the connection between the factors.

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16. Path-dependency, Externalities and Related Variety in Regional Innovation Systems

Zoltán Elekes

Evolutionary economics has become one of the most influential theories on the processes of technological change in the past few decades. Interested in the spatial aspects of said change, the newly forming approach of evolutionary economic geography explicitly relies on path-dependency. In this paper I focus on path-dependency and its key notions, such as positive feedback-loops and irreversible processes are at the heart of a dynamic economic structure and the evolutionary nature of technological change.

This paper[1] *argues that the path-dependency of a regional economy is linked to the newer evolutionary approach of related variety. It attempts to connect the evolutionary process of generating variety with the existing technological regime of a regional economy. This approach may serve useful insights for policymakers, when facing the inertia of a locked-in regional economy, especially in the cases of post-socialist economies of Central and Eastern European countries.*

We conclude that path-dependency is crucial for policymaking in a regional economy. Respecting the historic embeddedness of a local economy can help policy achieve its goal. Proximity, agglomeration economies and variety have path-dependent aspects. Related and unrelated variety affects the intensity of knowledge spillovers occurring in and between sectors, as well as the overall resilience of the regions' economy.

Keywords: path-dependency, externality, related variety, evolutionary economics

1. Introduction

In the realm of physics, time is perceived as one of several dimensions of space-time. The laws of physics, like the equations of Newtonian mechanics, explain the interactions and movements in said space-time. One particularly interesting property of such laws, including those of classical mechanics, is that they are time-symmetric. There is no constraint in their theoretical construct, banning them from being applied "backwards" in time. The developments of thermodynamics in the 20th century, most notably the second law of thermodynamics, introduced such constraints. It states that the *entropy* of an isolated system can never decrease. In essence, this means that the "perceived order" of a system decreases

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over time, and this change cannot be reversed. The Second Law thus represent time-asymmetry and irreversibility in theoretical physics. In economics, the mainstream neoclassical theory has similar time-symmetric characteristics and a disregard for time as a "real" factor. Evolutionary economics on the other hand recognizes the importance of irreversibility, and has a time-asymmetric approach.

In recent years of economic theory, evolutionary economics has become one of the most influential concepts of innovation, following the work of Richard R. Nelson and Sydney G. Winter. *Evolutionary economic geography*, interested in the spatial aspects of technological change, explicitly builds on the idea of path-dependency, the main focus of present paper. In the theory of processes of innovation and regional economics, much like the Second Law in physics, path-dependency has an important role in understanding self-reinforcing processes and irreversibility. Through these, history and time become "real" and important factors of economic and technological change.

In this paper I am looking to answer the question *what are the implications of path-dependent technological change based on agglomeration economies and related variety to policymaking?* In the first part of my paper I highlight key aspects of the theory of path-dependency from the point of view of evolutionary economic geography. In the second part I link the notion of path-dependency to the somewhat new idea of related variety, within the theoretical context of externalities. Finally, I outline suggestions for policymakers, especially in Central and Eastern European countries, based on the relation between externalities and path-dependency.

2. Path-dependency

The newly forming theoretical approach of evolutionary economic geography (EEG) analyzes the spatial properties of innovation and technological change. It consists of three distinct, yet interlinked concepts. First, the theory of *complex adaptive systems* argues that economic systems are by their nature in a far-from-equilibrium state, and their emergent properties cannot be derived from the individual components of the system in question. Second, the concept of *generalized darwinism* focuses on organizational routines, somewhat stable behavioral patterns of firms. These routines are the basis of variety, selection, adaptation and the evolutionary analogy itself, as applied in evolutionary economics (Lengyel – Bajmócy 2013). In this section I focus on the third main interest of EEG, the notion of path-dependency.

According to evolutionary economics, a theory is considered evolutionary if it incorporates random elements (variation) and mechanisms ensuring systematic selection. In addition, such theories contain forces granting continuity to successful variations. Finally, the aim of an evolutionary theory is to explain the historically embedded change of a variable or variable group. A theory like this is not completely stochastic, yet not completely deterministic either (Bajmócy 2007, Hideg 2001). This last part is exceptionally important for us now for two reasons. First, it offers a different approach of innovation processes than mainstream neoclassical economics. One, that does not consider the future of an economic system fully explainable by the complete knowledge of all economic forces in effect – much like Newtonian mechanics does in physics. Second, it highlights the importance of history in understanding technological and economic change.

Acknowledging the importance of historic embeddedness is linked to a number of methodological and epistemological considerations. First, it accepts realism as a valuable trait of a theory (Orsenigo 2007). In essence, a "history-friendly" theory refers to the specific historical context, when applying general evolutionary concepts (Dopfer 2011). Second, it is a step towards methodological holism instead of reductionism. Third, it relies widely on inductive logic, in connection with the extensive use of case studies when formulating theories. Fourth, the processes that generate and reinforce change in some directions but not others become important topic of research.

Thorstein Veblen's cumulative causality and Carl Menger's thoughts on the formation of institutions can be considered conceptual predecessors of *path-dependency*. In recent economic theory, Paul David and Brian Arthur introduced the concept through analyzing the economic history of technological change and self-reinforcing processes. There is no consensus among economic geographers regarding the extent to which path-dependency can be utilized in economic reasoning. Some consider it one of many factors in generating the economic landscape, while others see it as a focal point in explaining differences of economic performance and spatial distribution (Martin – Sunley 2010, Lengyel – Bajmócy 2013).

According to Glasmeier (2000, p. 269–270.) *"usually lying behind the notion of path-dependence is a series of factors that together add up to a directional bias"*. He also claims that using the term without linking these factors to the specific historic background renders path-dependency *"uni-dimensional"* and empty. We argue that this approach is quite compatible with the epistemological standpoint of "history-friendly" evolutionary economics, and as such can be a useful working definition in this paper for path-dependence. In addition,

filling the general term with context-specific properties can be translated intuitively to policymaking.

Several theoretical notions have characteristics, that link them to path-dependency. Cumulative causation, self-reinforcing processes and positive feedback-loops are at the heart of strengthening the aforementioned "directional bias". Recursive interactions of economic agents ensure this self-reinforcement. Numerous case studies track the diffusion of technologies, occasionally resulting in monopolies. In such cases, increasing returns appear for those using the dominant technology, contradicting the mainstream "law" of diminishing returns (Bajmócy 2007, Lagerholm – Malmberg 2009). And of course, externalities are intricately connected to the occurrence and prevail of path-dependency. The localized nature of knowledge and learning as well as the existence of knowledge-externalities generate regional lock-ins (Lengyel 2010). Facebook became the largest social networking site through "offering" the users network-externalities: the more were connected, the more valuable the social networks of those connected have become. In the next part of present paper, we will follow up on externalities, most notably related variety.

A relevant interpretation of path-dependency is that decisions in the past limit the range of options in the present. In a sense, history is embodied in the present (Allen 2004, Martin – Sunley 2010). Magnusson and Ottosson (2009) call this the "weak" interpretation of path-dependence. The "strong" interpretation takes it one step further, arguing that not exclusively the range of choices is limited by preceding events, but also the search processes of cognition and organizational routines. These restrictions in search patterns enhance the "directional bias" and are key aspects in lock-in situations.

The milestones of a path-dependent trajectory are generally the pre-formation phase, when several alternatives compete. It is followed by the path creation phase, when one of the alternatives emerges as dominant, gaining additional momentum. Next is path lock-in phase, in which the self-reinforcing processes significantly narrow down the range of possible choices. Finally, in the path-dissolution phase, the (economic or technological) system breaks out of lock-in (Martin – Sunley 2010). In light of economic and research practice, the most problematical part of this process is the last one. It is absolutely pivotal to understand, how can a regional economy break out of existing self-reinforcing patterns, most considerably for policymaking purposes.

The sequence of phases in this form may prove problematic for "history-friendly" application for a number of reasons. First, it is based on a clean slate. In reality, we seldom find a region or technological field, where several competitors appear "out of the blue". In

addition, a regional lock-in might be an emergent consequence of different industries in different phases of path-dependence. Second, as Martin and Sunley (2010) pointed out, the original explanations of path-dependent trajectories, rely on some sort of equilibrium reasoning, whether it be one equilibrium or a series of "temporary equilibria". However equilibrium reasoning is not compatible with evolutionary economics, where the economy is in a far-from-equilibrium state by its nature. Finally, the impulse breaking the lock-in was often considered an external shock, which is not necessarily the case in neo-schumpeterian reasoning.

The concept of path-dependency may prove useful in explaining current states of regional economies, spatial distribution of industries or the formation of local hubs in the global economy. Understanding the processes behind path-dependence can lead to a better grasp on the emergent phenomena of innovation and spin-offs. Its normative message is quite relevant for policymakers often trying to break out of regional lock-ins or national economic structure. In part two we will examine the new concept of related variety as a form of externality and a process of path-dependency. In the last part we will elaborate on said normative message, directing the main focus on the policymaker.

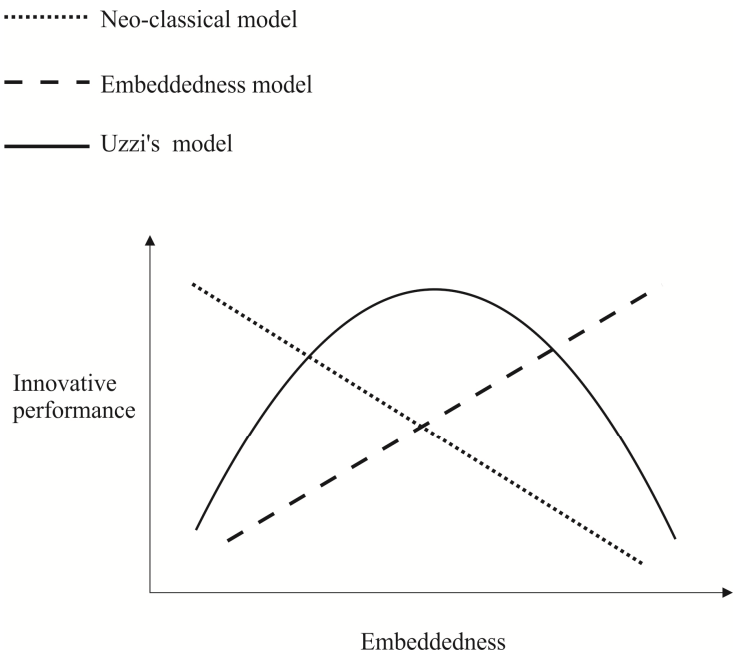
3. Related variety

Variety is a central concept in evolutionary economics. The process of generating variety continuously reproduces economic structure, and is the main source a adaptability in a regional economy. In this part, we explore the relation of related and unrelated variety with the ideas of proximity and agglomeration economies, key aspects of regional economic activity and distribution. While doing this, we are looking for connections with the processes underlying path-dependency.

As mentioned above, externalities may be considered forces that – with others – add up to path-dependency. The effects of these externalities are oftentimes enhanced by geographical, cognitive or otherwise proximity, as Boschma (2005) argued. On the one hand, proximity and embeddedness facilitates knowledge transfer and the emergence of variation. On the other hand, a certain distance between firms can yield flexibility and creative solutions. In this sense, too much proximity results lock-ins, while too little generates coordination issues and isolation of a firms creative processes (Figure 1). We would like to accentuate that the self-reinforcing aspects of path-dependent processes can be applied for proximity. The more firms are in close proximity (cognitive or otherwise), the more a new

firm can benefit from moving closer. Regional concentrations of economic activities or technological regimes create this effect and are created by it.

Figure 1 Relationship between the degree of embeddedness and the innovative performance of a firm



Source: Boschma (2005, p. 67.)

Externalities in the wake of concentration called agglomeration economies serve as an incentive for firms clustering in regions. *Localization economies* are available for firms within the same sector. In this case, sectoral knowledge spillovers occur and they are the basis for innovation processes. *Urbanization economies* arise from urban size and density, and affect all firms regardless of sector (Lengyel – Rechnitzer 2004, Heijman 2007). *Jacobs externalities* arise from the presence of a variety of sectors, and are available for the firms in the region. Jacobs externalities are considered one of the sources of regional knowledge spillovers (Frenken et al. 2007).

The connection of variety to agglomeration economies is twofold in the relevant literature. First, variety is a source of knowledge spillover in the region and is closely attached to Jacobs externalities within sectors. This can be considered *related variety* for these sectors. Second, variety can be seen as a portfolio of sectors, and in this manner it is a source of a regions stability in competitiveness (Frenken et al. 2007). Thus *unrelated variety* is linked to the adaptive capacity of the regional economy. This capability has been interpreted recently as

regional economic *resilience*, a form of "flexible stability" of the regions' economy (Tóth 2012).

From an evolutionary perspective it is important to ask the question: *variety of what?* With related variety, we focus on the variation of creative ideas, individual and organizational knowledge, and eventually innovation. This is compatible with the evolutionary economic approach of Nelson and Winter (1982), where the unit of variation – the *meme*, as called in general evolutionary theory – is the organizational routine. Unrelated variety is closer to a population level emergent property. A wide array of populational subgroups grants protective property against external shocks.

We can read the variety aspect together with proximity and agglomeration economies. If related variety is present in a region with agglomeration economies, with several firms in geographical and cognitive proximity that is, the knowledge spillovers of that region enhance innovation processes. If unrelated variety is present in the region, the cognitive proximity of firms in different sectors is less important for the systemic level resilience to arise (Asheim et al. 2011). Finally, we can link variety and cognitive proximity without the specific need for geographical proximity. In this case we find ways of understanding the unfolding technological trajectories of industries. In this sense, agglomeration economies have significance, when the cognitive space of generating related variety is overlapping the geographical space of the regional economy (Table 1).

Also the aforementioned relation between embeddedness and innovative performance may be present in the context of technology: related variety serves as a source of additional bifurcations on a trajectory, while the lack thereof yields a lock-in and need for path dissolution.

Table 1 Agglomeration economies, proximity and variety

Agglomeration economies	**Proximity**	**Variety**	**Effect**	**Path-dependency**
localization economies (MAR externalities)	geographical proximity; relational proximity	relatedness without variety	knowledge spillovers within the sectors	reinforcing existing pathways
Jacobs externalities		related variety	knowledge spillovers between the sectors	widening existing pathways
urbanization economies	geographical proximity	unrelated variety	regional resilience	facilitating path-dissolution
	relational proximity	related variety	branching of technological trajectories	preventing technological lock-in

Source: author's own construction

What is the relation between path-dependency and related variety? From a regional economic point of view, the answer is twofold. First, the presence of related variety generates positive feedback loops through knowledge spillovers for the related and supporting industries, reinforcing the existing "directional bias". Second, the presence of unrelated variety means a wide portfolio of unrelated industries for the region, thus generating the aforementioned "flexible stability" and a wider range of branching points for the economic and technological trajectories. However, this forecasts a possible relation between the "relatedness of variety" and the strength of path-dependency resulting in lock-in. The more related variety can be found in a region, the stronger the knowledge spillovers might be, leading to increased innovation potential and economic growth. On the other hand, this same region might become increasingly vulnerable to external shocks affecting its industries, and also this region is prone to be locked-in. Naturally, this *quasi-trade-off* requires further investigation.

In this part we explored the relationships between agglomeration economies, proximity and related variety. We found that the variety of firms and sectors in a region affects its innovativeness through knowledge spillovers, and also affects it resilience against external shocks. These spillovers occur in the form of agglomeration economies, and are closely linked to geographical and cognitive proximity. The latter has further connection with related variety in a sense that technological trajectories have additional branching points in the form of said variety. All together, these phenomena work as underlying processes of path-dependency. In the next part we explore possible applications of path-dependency and related variety for policymakers.

4. Consequences for policymaking

So far we briefly investigated path-dependency, a form of "directional bias" and a combination of underlying processes, self-reinforcing in nature. We have also seen the role of variety in generating knowledge spillovers in regional and technological context, working as one of said underlying processes. In the following paragraphs, we turn our attentions to the normative aspect of path-dependency, and articulate suggestions for policymakers on the basis of path-dependence and related variety.

In the literature of regional innovation systems it is widely accepted, that every region has unique aspects that rule out the use of uniform innovation policies (Tödtling – Trippl 2005, Vas – Bajmócy 2012). In the context of present paper it is important to reiterate this

principle, because it is based on “history-friendly” evolutionary economics. When making regional innovation policy, it is paramount to consider the institutional and economic history of the region, imprinted in the present. Adapting international best practices to local specifics and needs seems to be the way to go, “one size” most certainly does not “fit all”.

Another aspect of a policy embedded in the history of a locality is that it offers learning opportunities for the policymaker. Routines developed over time, cumulated in institutions may lead to more effective policies. Also the process of formulating policies benefits greatly from the involvement and participation of historically co-evolved institutions and entities of a local community (Bajmócy 2011). In this concept, policy is learning based, and trial-error is inherent part of the learning process. From this point of view the role of a policymaker is quite different from the usual. A “professional” policymakers distinctive ability is to coordinate between the participants, not “lead” them. Participation can help the legitimate formulation of policies, giving room for the learning of policymakers.

Irreversible processes in the wake of path-dependence increase the responsibility of a policy decision. An intervention in the present irrevocably changes the range of future options as well. This effect is most tangible in environmental and ecological issues, but it is also strongly linked to technological trajectories. Technology evaluations including potential stakeholders may alleviate some negative effects of technology spreading through self-reinforcing, path-dependent processes.

With a region on a path-dependent economic or technological trajectory, the range of options is limited by previous choices. Path-dependency is only considered an issue, when negative effects of these self-reinforcing processes outweigh the positive ones (intensive innovation, knowledge spillover, etc.). If the policy focus is inside the trajectory, it faces less uncertainty in exchange for a decreased mobility – the aforementioned range of options. If the focus is outside the trajectory, a wider range of possible policies exist, however the uncertainty surrounding these policies is much greater (Bajmócy 2007). The notion of the window of locational opportunity points out, that with radical innovations, there is no previous history narrowing down the range of locational options. However, as spatial positive feedback loops arise, this window of potential locations closes (Bajmócy 2013).

In any case, the policymaker may not only face the “weak” interpretation of path-dependency, but also the “strong” one. In this manner, policy have “directional bias” from the existing structure and trajectory of the regional economy, as well as from historically developed search routines, that narrow down the conceivable range of perception and solution of development issues.

This leads us to the next consequence. The policymaker is oftentimes part of the very socio-economic system it attempts to change. The self-reinforcing processes and feedbacks affect the policymaker and the policy alike. Through these feedbacks, the initial policy might have a delayed or altered effect. In the theoretical background of path-dependency we saw that the focal point of a path-dissolution phase is an external shock. The systemic approach of a regional innovation policy advocates considering the systemic innovation performance of a region (Edquist 2002). In such a complex system, policy can be seen as some sort of internal shock – or small historic event in evolutionary terms. In practice it is often the aim and desire of policymaking to become the origin of path-dissolution. However if a regional economy can be resilient towards an external shock, it may also be resilient towards an internal one, precisely because of the processes underlying path-dependency.

Regional policymaking strategies involving variety may focus on reinforcing related variety through attracting additional firms into the existing sectors of regional industries. It may also focus on attracting related and supporting industries to generate further opportunities for knowledge spillover. These goals may be achieved through facilitating the interactions between firms and sectors by increasing cognitive proximity when possible. On the other hand, focusing on unrelated variety may contribute to the resilience of a regional economy and the flexibility its industrial portfolio (Table 2). In any case, the economic structure and new variety generated by those within the structure mutually affect one another (Lambooy – Boschma 2001).

Table 2 Summary of aspects and policy implications of path-dependency and variety

Aspect	Policy implication
Historical embeddedness.	"History friendly" and differentiated regional policy.
Learning manifested in routines and institutions.	Learning policymaking and trial-error.
Irreversible processes.	Technology evaluation.
Range of possibilities and uncertainty.	May increase or decrease simultaneously.
Directional bias in search routines.	Bounded rationality in problem identification and solution.
Part of the complex system.	Altered effects of policy and resilience against intervention.
Related variety.	Reinforcement of knowledge spillovers and innovative potential.
Unrelated variety.	Diversification of industrial portfolio and regional resilience.

Source: author's own construction

Policymaking in path-dependent regional economies has special significance in Central and Eastern European countries like Hungary. The centralized creation of policies had catastrophic results in transition economies. In Hungary, the specialized industrial regions suffered from the dissolution of CMEA, followed by the decline of rural regions, previously specialized in agriculture. The local institutions and firms were limited in their adaptive capabilities by centralized policymaking, and several regions proved to be inadequately resilient to the external shock of entering the global market (Lengyel – Bajmócy 2013, Rechitzer 1997).

In this section we explored possible interpretations of path-dependency and related variety for regional policymaking. We found that path-dependent processes are intimately connected to the possible range of choices at the disposal of a policymaker. Different regional histories, intra-sectoral knowledge externalities and sectoral portfolios are all part of the systemic performance and possible future trajectories of a regional economy. Respecting the historic embeddedness of a local economy can help policy achieve its goal. Ignoring it may lead to unsuccessful policies, as seen in the case of Hungary and other Central and Eastern European countries.

5. Conclusion

We conclude by reiterating that path-dependency serves as theoretical bases for evolutionary economic geography. In this way it is connected to other aspects of the theory. Paying attention to the "real" history of a regional economy yields irreplaceable insights of the processes underlying path-dependency. Proximity, agglomeration economies and variety have path-dependent aspects. The concepts of related and unrelated variety have exciting possible applications in understanding the composition of a regional economy. They are also relevant in understanding why certain economies are more resilient than others against external shocks. This has increased significance when regions compete globally. The connections between these processes have relevant messages for policymakers intending to intervene to a regional economic system. With path-dependent processes at work, policy has extra responsibilities when making choices that affect the range of options in the future.

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