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Melinda Smahó
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The role of knowledge in regional development: theoretical considerations and the case of the Austrian–Hungarian border region

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Abstract

Economic growth and development theories have neglected the role of knowledge and space for a long time. However, it is widely accepted that knowledge has played a more and more important role in economic development, and – due to its spatial characteristics – also in regional development. The aim of this paper is to explore the role and some spatial characteristics of knowledge, as well as their impact on regional development, also in regard to border regions. After some theoretical considerations, the paper investigates some features and cross-border cooperations of knowledge holders in the Austrian-Hungarian border region.

Keywords: knowledge, universities, cross-border cooperation, Austrian-Hungarian border region

EconLit Codes: D830, O150, O330, R110, R230.

Introduction

Knowledge and new ideas have always affected economic and social development during the history of mankind. According to Mokyr *„technological progress has been one of the most potent forces in history in that it has provided society with what economists call a „free lunch", that is an increase in output that is not commensurate with the increase in effort and cost necessary to bring it about"* (*Mokyr*, 1990, 3.p.). However, there are essential differences between the role and importance of knowledge nowadays and in the past. These dissimilarities can be perceived along the following three dimensions:

- the amount of knowledge;
- the number of people employed in science;
- the process of generating, diffusing and exploiting knowledge.

The amount of knowledge was drastically growing during the last half century: 95 percent of the nowadays available knowledge stock evolved during the last 50 years (*Dőry* 2005). On the same lines, the number of people employed in science has been showing a dynamic growth as well: 95 percent of scientists have been ever living during the history of mankind, are working nowadays (*Simai* 2003), their proportion approximates 5 percent of the population (*Dőry* 2005). The way of genearating knowledge has also changed: while new ideas evolved as a result of spontaneous disclosure during the past centuries (*Mokyr* 2004), in the last decades, conscious R&D activity has become one of the most important source of knowledge-generation. Since the 1960's, knowledge has become the basis of developed countries' economic performance (*Innovation Management...* 2004; *OECD* 1996).

However, a plenty of publications stay at our disposal about the impact of knowledge on economic and social processes, and different changes caused by them, as well as about new phenomena and tendencies, but much less authors are dealing with the appearance of knowledge in theoretical frameworks as well as with its incorporation into growth models. All of these things arise the problem of measurability of knowledge, after all in economics – first of all in its strongly mathematized neoclassical school –, where always a greater attention was paid to the measurable factors (capital, labour) (*Kocsis–Szabó* 2000). Thus, knowledge has always challenged economic science. The evolution of the knowledge economy continuously enhances this challenge.

Furthermore, mainstream economics also neglected the role of space. Economic theories – except for some authors who can be regarded as forerunners of regionalists (e.g. Thünen, Lösch, Marshall) – handled space maximal as an exogenous factor (*Lengyel–Rechnitzer* 2004;

Meyer 2005), even international economic theories regarded the economy as a „wonderland of no spatial dimensions" (*Isard* 1956, 25[1], cited by *Lundvall–Maskell* 2003). Paul Krugman drew attention to the importance of space again: he and his school of new economic geography take space into account as an endogenous variable by explaining economic phenomena. Transition to the knowledge economy has valued the role of regions in the world economy. Nowadays, regions serve as seedbed of innovations (*Gertler* 2005).

The first part of my study deals with the interpretation and characteristics of knowledge by some famous economic growth theories or theoretical directions. Next to stressing the differences, I also try to shed light on the role of space, and the features of knowledge according to the versions of mentioned theories complemented by spatial dimension. However, spatial characteristics of R&D (*Grosz* 2007; *Lados* 2005) and higher education (*Rechnitzer* 2009) were analysed by more authors in Hungarian relations during the recent years, I associate cross-border situation as a further dimension to the analysis. Thus, the second part of my study contains a case study about the Austrian-Hungarian border region with the focus on knowledge holders of the West-Transdanubian region as well as their cross-border relations.

[1] Isard, Walter (1956): Location and Space Economy. MIT Press, Cambridge.

1. Knowledge and regional development: theoretical considerations

According to the classical location theories, natural resources, geographical proximity to input and output markets, such as minimizing transport costs determine the location of enterprises underlying regions' economic performance (*Lengyel−Rechnitzer* 2004). From the point of view of the international economics, Adam Smith explained regional specialization and development by absolute advantages, while David Ricardo introduced comparative ones. Both type of these advantages depended mainly on natural resources of regions, while knowledge and technology appeared in their evolution only in an indirect way, as a factor of increasing labour productivity (*Armstrong−Taylor* 2004; *Cooke−Leydesdorff* 2006; *Deane* 1984; *Smith* 1992 [1776]). Thus, according to the neoclassical growth theory, spatial disparities of traditional factors of production weren't generated by knowledge, but much more by differences in regions' advancement (*Armstrong−Taylor* 2004; *Lengyel−Rechnitzer* 2004). After all, paralell with the evolution of the knowledge economy, knowledge became a more and more important factor in explaining economic growth and development.

But, at the same time, geographical proximities became easily bridgeable as a result of globalization processes, among others as a result of rapid development in infocommunication technologies, diminishing transport costs as well as breakdown of trade barriers. Globalization has changed several factors of production into ubiquity (*Malmberg−Maskell* 2005), because production became spatially transferable, and knowledge can be transmitted globally (*Cséfalvay* 2004). Although knowledge can be transmitted globally, spatial differences in regions' advancement did not equalize, moreover, we are witness of even more unequal geographical distribution of production and innovation (*Gertler* 2005). All of these theoretical findings have led me to suppose that knowledge disposes of such spatial characteristics, which make it resistive against globalization processes, and in this way, make it (one of) the most important factor of regional development. Thus, my first hypothesis (H1) states that *knowledge has been playing a more and more important role between the factors influencing regional growth and development.*

Some classical economists (e.g. Smith, Ricardo, Thünen, Senior) already handled knowledge as one of the factors of production, however, they described its characteristics and appearance in different ways. According to the economic literature, Alfred Marshall – one of the founders of neoclassical economics – recognized the economic importance of knowledge. In his work 'Principles of Economics' (1890) he wrote that „knowledge is our most powerful engine of production; it enables us to subdue Nature and force her to satisfy our wants" (*Marshall* 1961[1920], 138.p.). On the contrary to this, the majority of neoclassical economists did not take knowledge into account, except for price information. They assumed that economic

entities were perfectly informed, thought rationally and took logical, rational decisions (*North* 2005). Neglecting knowledge can be partially originated in the fact that they were not able to incorporate knowledge into the strongly mathematicized models preferred by them, and instead of this, they put aside knowledge in form of simplifier assumptions (*Meusburger* 1998). Other authors went on other ways: Joseph Schumpeter (1911) emphasised the role of innovations and discovered that Kondratieff's long waves (*Kondratieff* 1935) were set off by cyclical group of innovations. Friedrich August von Hayek stressed the role of knowledge and information in economic decisions (*Mátyás* 2003). In his point of view, the most important economic problem of the society was the way of utilizing scattered knowledge, which cannot be totally possessed by one individual (*Hayek* 1995 [1945]).

1.1. The role of knowledge in growth theories

Growth theories of the last half century as well as new institutional and evolutionary economics also tried to incorporate knowledge, however, they attributed different characteristics to it (Table 1). Neoclassical growth theory – based on Solow's second model including technical change – assumes constant returns to scale, and regards technology as an exogenous factor. This theory considers knowledge as a pure public good[2], which means that technology is anywhere and for anybody available. Since technology is exogenous, the model does not deal with questions and costs of technological development: knowledge is assumed to be disposable and utilizable for free. It follows that this theory does not count neither with temporal nor with spatial diffusion mechanism of knowledge (*Armstrong–Taylor* 2004; *Ács–Varga* 2000; *Czeglédi* 2006; *Lengyel–Rechnitzer* 2004; *Solow* 1957). Therefore, differences of regional growth rates can not be explained by inequal spatial distribution of knowledge, but they can be originated from the uneven spatial distribution of traditional factors of production (capital, labour, natural resources) (*Armstrong–Taylor* 2004; *Döring–Schnellenbach* 2004).
Endogenous growth theories from the 1970-80's eliminate the inadequacy of neoclassical growth theory, additionally from more points of view. Endogenous growth theories regard knowledge as an endogenous factor of production i.e. as an output of conscious research and development (R&D) activity carried out by profit-oriented organisations (*Meyer* 1995; *Czeglédi* 2006; *Ács–Varga* 2000). Therefore, these theories take into account the costs of knowledge production as well. It follows that producers of knowledge are interested in excluding unjustified users from taking advantage of the costly produced knowledge.

[2] Pure public goods are non-rival and non-excludable goods. Non-rivality means that more users can enjoy the advantages of goods both parallel and successively. Non-excludability denotes that exclusion of unjustified users is very costly for the originator of the good (OECD 2001, 13.p.).

However, different means of intellectual property (e.g. patents) can be applied, but these are not able to ensure neither perfect protection, nor a perfect excludability of knowledge. Unintended knowledge flows – knowledge spillovers[3] – can arise because of injuring intellectual property rights or publishing informations during the patenting procedure (*Ács–Varga* 2000; *Erdős* 2003; *Romer* 1990). Furthermore, the physical availability of knowledge is limited by space, i.e. it is not perfectly mobile, which results that space can contribute to the partial excludability of knowledge as well (*Karlsson–Johansson* 2004; *Romer* 1990; *Varga* 2004).

Table 1 (Spatial) characteristics of knowledge by different economic theories

	Neoclassical growth theory	*Endogenous growth theory*	*New institutional and evolutionary economics*
Charac-teristics of knowledge	• Exogenous • Pure public good	• Endogenous • Mode 1 (R&D) • Partially excludable	• Institutions (D. North) • Heterogeneity • Mode 2 (interactive)
Space and knowledge	• Perfect mobility	• Local knowledge spillovers • Regional knowledge base • Absorptive capacity	• Regional innovation system • Regional knowledge base (Cooke, Holzinger) • Learning regions

Source: own construction.

First of all, the diffusion of new and still not codified (tacit) knowledge[4] in form of knowledge spillovers, has a crucial importance for innovations. Whereas the diffusion of tacit knowledge is geographically limited, knowledge spillovers have a local character. However, the effects of knowledge spillovers differ by regions, in particular it depends on the stock of accumulated knowledge in the region as well as on the regional institution system. It follows that each region is able to produce new knowledge in order to enhance its productivity, while others are forced to import the technology. Knowledge producing as well as knowledge absorbing capacity of a region depends on the stock of human capital, the institutional environment and the collective learning process. The bigger the stock of accumulated knowledge of a region is,

[3] Knowledge spillovers mean the diffusion of knowledge between non-market conditions, i.e. these knowledge flows are not paid at all or the paiment is smaller than the value of the gained knowledge (Varga 2004).

[4] Michael Polányi distinguished between two types of knowledge: explicit (codified) and implicit (tacit) knowledge. Explicit or codified knowledge can be easily conceptualized in form of words, and can be transmitted by the formal language (Polányi 1997 [1966]). It can be obtained by reading books, attending lectures or accessing different data bases (OECD 1996). On the contrary, implicit or tacit knowledge has a personal character, encumbering its formalization and transmission (Polányi 1997 [1966]). It can be obtained only by following and imitating the maestro for a long time. This requires frequently repeating personal interactions, which are limited by space (*Karlsson–Johansson* 2006; OECD 1996). (In detail see later.)

the more able is it to learn i.e. the more knowledge it is able to absorb. Thus, in the endogenous growth theory, not only economic factors, but also the local social, cultural and political institution system and – as a part of it – also the knowledge base of a region play an important role in the explanation of permanent differences in regions' advancement (*Armstrong–Taylor* 2004; *Döring–Schnellenbach* 2004; *Dőry* 2005).

1.2. Interpretation and role of knowledge in evolutionary and new institutional economics

Knowledge also has a central role in the evolutionary and new institutional economics. However, these directions of economics are not uniform, they have some common characteristics. They broke with the typical – homogenous, perfectly informed and totally rational – economic man of the neoclassical economics, and assume economic actors to be heterogenous and only bounded rational, while information is assumed to be asymmetric (*Hanusch–Pyka* 2005; *North* 2005). Individuals do not interpret the world and do not take their decisions according to perfect information, but much more according to their so called shared mental models (*North* 1993; *North* 2005). "Mental models are the internal representations that individual cognitive systems create to interpret the environment" (*Denzau–North* 1993, 2.p.). Mental models are based on individuals' cultural heritage, which is composed of norms, values and knowledge accumulated and transferred over generations. Then they are shaped further by experience individuals obtain in the local environment, as well as by knowledge they get through formal learning[5]. Consequently, mental models have a plenty of variations changing continuously over time. (*North* 1993; *Denzau–North* 1993, 2.p.).

Common cultural heritage as well as similar experience likely result in the evolution of convergent – dominant – mental models. The communication between individuals with similar mental models is usually easier and more effective, these people usually have similar opinions. Over time, formal (written and unwritten law, rules, prescriptions) and non-formal (traditions, behavioural norms) institutions as well as ideologies emerge from dominant mental models. "Institutions are the rules of the game of a society" (*North* 1993, 5.p.), their most important function is to reduce uncertainty. Therefore, institutions with their rigid and slowly-changing nature can be regarded as fundamental building blocks of societies. At the same time, institutions contribute considerably to economical, social and technological

[5] Formal learning usually takes place in educational institutions, and it is honored by a certificate (in case of finishing successfully). (*Memorandum*… 2000, 7.p.)

changes: in form of positive as well as negative incentives they ensure the stability that is necessary to manage changes (*Johnston* 1992; *North* 2005).

Thus, knowledge, especially tacit knowledge plays a more and more important role in the explanation of economic growth and development, while the theoretical considerations of knowledge creation have also changed. These tendencies can be recognized in the economic theories as well, even if in a weakener extent than necessary (*Kocsis–Szabó* 2000). While some endogenous growth models originated knowledge from traditional research and development activity (R&D), recent economic directions (evolutionary and new institutional economics) as well as management theories consider knowledge creation as a social or interactive process (*Leydesdorff–Scharnhorst* 2003; *Romer* 1990). Gibbons called the first procedure Mode 1, while the second one Mode 2 knowledge creation process (*Leydesdorff–Scharnhorst* 2003).

According to – one of the recent management theories – the Nonaka-Takeuchi model, new knowledge is generated through a conversion between different types of knowledge. The first step of the process is sharing tacit knowledge (socialization), which is followed by externalization, i.e. knowledge will be codificated (explicit knowledge). Then, different explicit knowledge elements will be combined, recontextualized and synthetized, which process also generate new knowledge. Finally, explicit knowledge will be converted into tacit knowledge through understanding, traditional learning as well as learning-by-doing (internalization). Thus, generation of new knowledge is a continuously growing spiral process, which starts from the level of the individual and go on toward community as well as organization level. Finally, it crosses the border of the organization and overreach to inter-organization level (*Nonaka* 1994; *Nonaka–Takeuchi* 1995; *Sándori* 2001) (Figure 1).

Figure 1 Types of knowledge conversion

Nonaka–Takeuchi 1995, 71.p.; Mészáros 2001

Also, originally all knowledge has a local character, namely in double meaning. On the one hand, knowledge is geographically and historically determined, which means that it comes into existence in a given (historical) time period, and between different conditions, e.g. in diverse geographical location, by several people, facilities and institutions. In this context, generating knowledge means not only a traditional invention, but it also covers an active and creative constitution process, which takes place in a given geographical area, according to the local rules, habits and conditions. On the other hand, local character of knowledge means that the nature and features of knowledge are considerably influenced by the conditions (e.g. material and histirocal conditions as well as related social interests) of its generation. The reason is that knowledge creation is a social process, thus, knowledge comes into existence from the geographically and historically changing social habits. Consequently, knowledge is deeply embedded in the society of several areas, and its local character does not mean only the knowledge which is characteristic or concerning in a given geographical area, but it always refers to the context of its generation (*Johnston et al.* 2000).

However, all knowledge is local at the time of its generation, one part of it will separate from the knowledge creator person during the so called knowledge codification process. As a result, one part of knowledge becomes explicit, while the other part remains tacit knowledge. While explicit knowledge can easily be formalized and transmitted by words and formal language (e.g. by reading books or listening lectures), the verbalization and transmission of tacit knowledge is very difficult, due to its personal and informal character. Acquiring tacit knowledge usually takes plenty of time, and happens often unperceived (e.g. by observing and following the maestro) (*Karlsson–Johansson* 2006; *OECD* 1996; *Polanyi* 1997 [1966]). Obtaining tacit knowledge requires mutual trust and understanding, a common language and frequent personal interactions i.e. the physical presence of both deliverer and recipient of knowledge. However, a growing geographical distance between the actors raises the cost and diminishes the frequency of personal interactions. Thus, the dispersion of tacit knowledge has geographical boundaries (*Audretsch* 1998; *Cooke et al.* 2007), and therefore it is called sticky (*von Hippel* 1994). Furthermore, tacit knowledge composes an essential part of a region's knowledge base[6] as well.

[6] The knowledge base of a region encompasses all knowledge and experience that a region possesses, can offer and use. It is based on cultural foundations and local values, evolves slowly and organically and rootes deeply in the local culture (Holzinger et al. 1998).

The link between knowledge and regional development are established by innovation i.e. the application of knowledge. New institutional and evolutionary economics understand innovation as an interactive learning process. Whereas new knowledge – the basis of innovation – is local and contextual, innovation can be compassed as a socially and spatially embedded, interactive learning process inseparable from its institutional and cultural contexts (*Asheim* 1999). It follows that differences in regions' innovation activity can not be explained by classical location factors but more and more by economic actors' networking abilities (*Koschatzky* 2004). Sharing tacit knowledge became one of the most important motivation factors of networking and underlies the process of collective learning (*Oerlemans–Meeus–Kenis* 2007).

Since collective learning is based on sharing tacit knowledge – which requires spatial proximity, mutual trust, common language and common values –, it is a local process (*Malmberg–Maskell* 2005). Trust in the partner enhances the willingness to share knowledge, which results in joint knowledge. This leads – through accelerated innovation – to an increase in the business performance (R1). The more an organisation learns, the bigger absorptive capacity it can possess, which improves further the organisation's efficiency in knowledge sharing process (R2). In progress of time, a successful cooperation enlarges the trust between partners, which follows that interactions become more and more frequent. Due to the mutual conformation of partners, common habits evolve, which tends to deepen the trust between the partners (R3) (Figure 2) (*O'Callaghan* 2006).

Figure 2 Self-reinforcing loops of interorganizational knowledge transfer and learning

Source: O'Callaghan 2006, 7.p.

According to the regional innovation system approach based on the new institutional and evolutionary economics, innovation and learning processes taking place in a region are encouraged by different organisations (e.g. universities, research institutions, science parks, innovation centres, technology transfer organisations and other educational institutions) and also by regional political measures (Figure 3). However, intensive interactions of the mentioned organisations with local firms are an important prerequisite of knowledge production, diffusion and application process (*Cooke et al.* 2007).

Figure 3 Regional Innovation System

Source: Cooke et al. 2007, 54.p.

Higher educational and academic research institutions inside of a region underlie the knowledge production sub-system, where traditional knowledge generation i.e. R&D is taking place (Mode 1). Nevertheless, according to some views, traditional knowledge production process of universities is increasingly shifting to the interactive knowledge generation (Mode 2). It means that knowledge is not generated solely in doors any more, but it originates from the collaboration of state, industry and academic sectors (triple helix). During this process, each sector partially undertakes the roles of others, e.g. universities – as entrepreneurs – participate increasingly in the transmission, communication and economic utilization of knowledge generated by them (*Cooke et al.* 2007; *Etkowitz* 2002).

Knowledge accumulating through local learning processes continuously increases and forms the knowledge base of a region as well as its institutions (*Koschatzky* 2004). However, this slowly, cumulative and path-dependent process contributes to the regional development, the region also needs external stimulus. Shortage in external information comprises the danger of lock-in, therefore incorporation of external information into regional knowledge base is of key importance. This goal can be achieved by joining to global networks (*Capello* 1999; *Fuchs–Wassermann* 2005; *Malecki–Hospers* 2007).

1.3. The special case of border regions

Development of border regions – being in a very special situation – can also be explained on the basis of these theories. Border regions with at least two different knowledge cultures can develop into a common knowledge space through the coevolution process of space, milieu and knowledge. The starting point of the process is that border as a social space structure influences the actions and interactions taking place in the border region. The continouos repetition of these actions and interactions leads to the development of common routines and habits, actors obtain more and more knowledge about each other knowledge culture. These knowledge elements slowly infiltrate into the informal rules and institutions of the area, and later they reflect in the formal institutions as well. The increasingly proceeding of common formal and informal institutions in the cross-border cooperation results in the evolvement of a new common knowledge culture which makes possible the social reconstruction of the areas divided by the border (*Fichter-Wolf* 2008) (Figure 4).

Figure 4 Coevolution of space, milieu and knowledge

Source: Fichter-Wolf, 2008, 43.p.

Universities are usually considerable regional actors, additionally, in more point of view. Universities are deeply embedded in the local environment, and have remarcable effects on the regional economy (*Rechnitzer–Hardi* 2003; *Hamm–Wenke* 2002; *Mezei* 2007). Furthermore, as a part of the regional innovation system they have a key role in knowledge creation and mediation (*Cooke et al.* 2007). Nowadays, interaction and communication play a more and more important role in the knowledge generation process, also in the traditional knowledge creation process. Therefore, cross-border relations can remarkably enhance the knowledge creation capacity of universities, and – through this process – they also can contribute to development of the whole border region.

2. Cross border cooperations of West-Transdanubian higher educational institutions

Most of the international cooperations of West-Transdanubian higher educational institutions evolved during the 1990s, after opening the borders. In the second half of the decade, opportunities as well as financial sources of the cross-border cooperations were expanded. The starting of Hungary's EU-accession process opened the pre-accession funds, out of which Phare CBC Program supported especially cross border cooperations. Since that time, needs for and possibilities of cross-border cooperations have changed. The EU-accession of Hungary as well as the introduction of the credit system at the Hungarian higher educational institutions can be expected to result in a growing interest for universities in the Austrian–Hungarian cross-border region. Hungarian universities – first of all in the Austrian–Hungarian border region – are expected to compete for students more and more strongly, and Austrian higher educational institutions are likely to appear between the competitors (*Rechnitzer–Smahó* 2007).

On the other hand, according to the mentioned new institutional and evolutionary economic theories, knowledge flows and local learning processes enhanced by frequent personal interactions are essential for a region's development. Therefore, finding the possibilities of cooperation in the competiton would be profitable for both Austrian and West-Transdanubian higher educational institutions. My second hypothesis (H2) states that *higher educational institutions in the Austrian-Hungarian border region do not utilize totally the advantages originating from their geographical proximity and cross-border position*. I try to prove this hypothesis by analysing the features of knowledge holders and their cross-border

cooperations first of all at the Hungarian side of the border, sometimes referring to the point of view of the Austrian higher educational institutions as well.

2.1. Knowledge holders in the West-Transdanubian region

According to the statistics, there are ca. 26 thousand students and ca. 1200 teachers in West-Transdanubia (Table 2). In 2008, the seats of two universities and one college can be found within the region (Figure 5). The biggest university of the region is the West-Hungarian University, with its seat in Sopron. Four of its actually ten faculties, namely the Faculty of Forestry, the Faculty of Wood Sciences, the Faculty of Economics and the Faculty of Benedek Elek College of Pedagogy are located in Sopron. It has further faculties in Mosonmagyaróvár (Faculty of Agriculural and Food Science), in Győr (Faculty of Apáczai Csere János Teacher Training College), and in Székesfehérvár (Faculty of Geoinformatics), the last one is located out of the region. Actually, it has further three faculties in Szombathely, because on 1st January 2008 Berzsenyi Dániel College, consisted of three faculties, became a part of the West-Hungarian University, and functions at present as Savaria University Centre (its faculties are currently called Faculty of Humanities, Faculty of Sciences, Faculty of Physical Education, Visual Arts and Music).

Table 2 Number of students and academic staff teachers in the West-Transdanubian higher educational institutions, 2008

	Number of students	Academic staff teachers
West-Hungarian University	15458	828
Széchenyi István University	10732	394
Theological College of Győr	292	35
Total	26482	1257

Source: Statistical Yearbook of Education, 2008/2009.

Figure 5. Seats of universities and Regional Development Agentures in the Austrian-Hungarian Border Region

Source: Strohmeier 2007, 262.p.[7]

[7] Berzsenyi Dániel Főiskola was integrated into the West-Hungarian University and nowadays operates as Savaria University Centre in Szombathely.

2.2. *Characteristics of cross-border relations*

Higher educational institutions may have diverse international contacts, which can be categorised by several aspects, e.g. content, time span, intensity and other characters of the cooperation. According to the interviews carried out in frame of an empirical research programme in the border region[8], the system of international relations of the West-Transdanubian higher educational institutions can be put into the following hierarchical system (*Rechnitzer–Smahó* 2007) (Figure 6).

Figure 6 Hierarchy of international relations

Source: Rechnitzer–Smahó 2007.

Strategically important cooperations of the institutions stay at the top of the pyramid. Typical forms of these are trainings that give a common degree, and strategic research directions done together with foreign universities. These types of cooperations require very stable, intense, and well-established institutional relations, and in case of the West-Transdanubian universities and colleges there can be found only a few example of them. The overall contracts can be found on a lower level, which are contracts of long-term, general cooperation agreements, that are mainly of educational type but may expand on research cooperation. These framework agreements are generally indefinite, i.e.valid till resolution or withdrawal (*Rechnitzer–Smahó* 2007).

[8] Uniregio – Universities in Cross-border Cooperation. AT-HU-05-01-018 Interreg IIIA project, carried out by the Hungarian Academy of Sciences Centre for Regional Studies West-Hungarian Research Institute and its partner institutions, Fakultät für Interdisziplinäre Forschung und Fortbildung Wien and Danube University Krems.

The great majority of higher educational institutions engages in international scholarship programs (Erasmus, CEEPUS) through which they are members of an international institutional network. Regarding their content, these contacts cover students' and teachers' exchanges between institutions, both sending and reception. Universities and colleges – with a foreign partner's approval – may take part in different EU programs, for example in Phare CBC, Interreg, CADSES, as well as in EU5, EU6 and from 2007 EU7 research framework programs. However, project cooperations have often an ad-hoc character. It means, that these relations are generally not durable, and after finishing the project their intensity is often declining. Without conscious intensification, these relations do not lead to the evolution of strategic cooperations. The lowest level of the international contact hierarchy stay the non-formalised cooperations, personal vocational contacts, individual actions. Generally, these are the most extensive contacts, since a lot of foreign country relations are on the institutions' teacher's, who attend different international conferences (committee membership, review, guest instructor, stb.) and international scientific community (foreign country publications, international acknowledged) (*Rechnitzer–Smahó* 2007).

The system of international relations in case of a higher educational institution has been formed for decades. It follows that traditional universities have more extended and more stable contacts than the younger institutions. Both the age and the type of institutions have an impact on the system of intertanional contacts. Colleges provide mainly educational functions, in their case research cooperations and international contacts receive a much smaller emphasis, than at a traditional university (*Rechnitzer–Smahó* 2007).

Almost all West-Transdanubian universities and colleges have Austrian relations. The partner institutions are mostly located in Vienna, but a numerous number of contacts with other Austrian higher educational centres was explored, for example with Linz and Graz. There are traditional cooperations, which can be originated from the common history of the institutions (e.g. West-Hungarian University Faculty of Agriculural and Food Science in Mosonmagyaróvár and University of Natural Resources and Applied Life Sciences in Vienna), while other relations are based on similar institutional profiles, personal contacts (all institutions), common applications and research programs (e.g. Széchenyi István University–TU Wien), or common educational cooperations (e.g. Széchenyi István University–TU Wien–Technical University Bratislava). The actions are primarily teacher and student exchanges within the frame of the Tempus program, but there are also direct agreements at institutional level (*Rechnitzer–Smahó* 2007).

On the contrary of the exisiting and explored cross-border contacts, our research stated that the institutions do not take all advantages of their cross-border situation, for example geographical proximity, similar profiles, easy and quick accessibility or opportunities of common applications. More reasons were explored that hold up the cross-border cooperations of West-Transdanubian universities and colleges (*Rechnitzer–Smahó* 2007).

At first, the insufficient language skills of both teachers, researchers and students should be mentioned, because these actors are the participants of educational and research cooperations, teacher and student exchanges as well as different foreign language courses and lectures. In Győr-Moson-Sopron county ca. 20-25 percent, while in Vas and Zala counties 15-20 percent of the population speaks at least one foregin language, according to the data of the last census in 2001. Although, these proportions around or over the national average of 19.2% are quite good in Hungarian relation, the language skills of the Hungarian students and population are lagging behind of those of the West-European inhabitants (*Rechnitzer–Smahó* 2006). Consequently, Hungarian students are not really interested in courses held in foreign languages, while the lack of these courses of the West-Transdanubian universities encumber the reception of students arriving from the foreign partner institutions (*Rechnitzer–Smahó* 2007). Fortunately, this situation has been started to improve with the introduction of some courses held in foreign languages in the West-Transdanubian universities.

Furthermore, cross-border cooperations of West-Transdanubian higher educational institutions are hindered by lack of administrative capacities and financial resources, wage-differentials, and in some cases by the different training structure of the institutions.

Interviews with West-Transdanubian higher educational institutions' leaders show that international research projects are going on departmental and faculty level. Consequently, international projects and cooperations are also handled at this levels, but not at university level. Therefore, the system of international cooperations within the West-Transdanubian universities and colleges are very fragmented and not embraceable at all, which slower and hinder both the building of strategic contacts and the developing its directions. Austrian and German higher educational institutions develop their international relations much more consciously, based on an internationalization strategy, which is not typical for the West-Transdanubian higher educational institutions at all. The fragmentation of international contacts make it difficult to develop an internationalization strategy at university level concerning future international cooperations (*Rechnitzer–Smahó* 2007).

The Vienna University of Economics and Business Administration (WU) defined more criterias in its internationalization strategy which have to be fulfilled by the potential partner

institutions. Between the criterias are mentioned for example the membership in international networks (PIM, CEMS), the rank of the university or business college; accreditation (EQUIS, AACSB), excellence, elasticity, openness, compliance towards WU; the partner institution's accommodating ability to WU structures; foreign language courses, and German language skills of the partner institute (Sporn 2002). However, Central and Eastern European countries appear as potential cooperation target area of the WU, but the university don't strive to take advantage of geographical proximity. Instead of this, it builds up cooperations with the leading business universities of the neighbouring countries (e.g. Corvinus University, Budapest). It indicates on the one hand that the quality of the partner institution is much more important for the Austrian universities than geographical proximity. On the other hand it proves that advantages of geographical proximity aren't utilized adequately by the higher education institutions in the Austrian-Hungarian border region.

2.3. Cross-border relations from the student's point of view

Results of an empirical research carried out in the West-Transdanubian region show that 7,4% of questioned students[9] would like to move abroad after graduating and seek a job in a foreign country, while additional 1,7% of them plan to study further abroad. Thus, overall 9,1% of respondents think out some future plans for the time after graduation (Figure 7) (*Páthy–Tóth* 2007).

Figure 7 Future plans of students (%), (N=1304)

Source: Páthy-Tóth 2007, 174.p.

[9] For the methodology of the questionnary see Páthy–Tóth 2007.

2,1% of asked students reported about an accomplished foreign scholarship, while ca. one third of respondents plan a foreign scholarship during their studies (before graduation). This is a small proportion at the level of desire as well, and the research found that only a small proportion of these plans will be realized. The most preferred destination countries are the English and German speaking ones: Great Britain, Germany and Austria (*Páthy–Tóth* 2007). The neighbour country Austria stays at the third place, which also indicates that geographical proximity is not the most important factor in setting up preferences (Table 3).

Table 3 The 10 most preferred destination country

Country	*Number of mentions at the 1st place*	*Number of mentions at the 2nd place*	*Number of mentions at the 3rd place*	*all mentions*
Great Britain	97	63	41	201
Germany	79	68	38	185
Austria	***44***	***43***	***29***	***116***
Italy	36	14	15	65
Spain	19	21	21	61
USA	14	23	24	61
France	9	18	15	42
the Netherlands	8	16	13	37
Finland	14	4	18	36
Switzerland	5	6	20	31

Source: Pátyh–Tóth 2007, 175.p.

The fact that 65,5% of the asked students does not plan a foreign scholarship in the future at all is schocking and shows a high level of students' immobility. Naturally, international relations and cooperation treaties of universities influence the possibilities of students widely, but some other essential reason was also explored. 26% of students alluded to financial problems, namely scholarships usually do not cover all costs of study and residence abroad, and the majority of students can not undertake the additional financing. 19% of questioned students answered that they are inhibited from studying abroad by their language problems. Finally, the most shocking fact is that almost one quarter (22%) of respondents are not interested in a foreign study at all (*Páthy–Tóth* 2007).

All of the mentioned facts and results show that there are still reserves in cross-border cooperations in case of West-Transdanubia. These advantages should be better exploited in order to dynamize the Austrian-Hungarian border region and develop its knowledge base.

3. Suggestions for accelerating cross-border cooperations

The role of international cooperations has significantly changed from the beginning of the nineties till our days: international relations become more increasingly a need instead of an opportunity. This tendency is expected to continue and get stronger in the future: international cooperations will influence and determine the competitiveness of higher educational institutions more increasingly, thus they will become one of the key of their future success. It follows that universities and colleges should focus on the development of new international contacts as well as on the extension and intensification of their existing international relations. Although the intention and the interest for international cooperations are existing in the majority of the West-Transdanubian higher educational institutions, universities and colleges do not consider international relations as strategically significant (*Rechnitzer–Smahó* 2007).

From the side of the West-Transdanubian universities, it would be necessary to lay the emphasis on the developing of its internationalization strategy and according to this, on a more conscious building of its international contacts. In order to realize this, they should have to review the already existing but not systematized departmental and personal contacts and research projects, and after that they sould have to define the possible and desired future directions of international contacts (*Rechnitzer–Smahó* 2007).

In order to develop foreign country contacts, it is important to improve the teachers' and students' language skills, and to introduce foreign language trainings and courses into the training supply of West-Transdanubian universities and colleges. Some of them already have started to realize the mentioned suggestions. They are planning to launch different training courses in German and/or English involving their Austrian partner institutes (*Rechnitzer–Smahó* 2007).

To sum up, it can be said that West-Transdanubian higher educational institutions should develop their internationalization strategy, define their own goals and opportunities and try to fulfil the requirements set up by the potential partner institutions in order to reach a long-term success. Finally, we have defined some possible developmental directions of cross border cooperations according to the following (*Rechnitzer–Smahó* 2007):

- Get to know each other properly, introduction, and launch of cross border communication programs in order to generate and motivate cooperations.
- To create organizational frameworks for the cooperations (e.g. Cross-border Rector's Council, institutional delegates on organizing the contacts, secretariat, etc.).
- To organize a common conference about the situation of our macro region in Europe, and to held a forum about the possible higher educational cooperations. The frameworks are given within Centrope and Jordes+ programs, but numerous additional programs motivate the actors to take advantage of its cross-border situation and accelerate multiregional cooperations.
- Get to know of each other's research capacities and research results in order to be able to plan fruitful future cooperations based on regional capabilities and economic characteristics.
- To make out a survey on the training supply of different disciplines (at bachelor, master, postgraduate and doctoral level), and to make it available for the students of the cross border region.
- To ecourage student mobility through harmonization and mutual acknowledment of training programs.
- To publish the list of partner institutions on the universities' website, and in this way to increase the attractiveness of the institutions between the potential students.

Conclusions

According to the literature of general economics and regional science I have studied, it can be stated that authors and economical directions interpret the concept of knowledge in different ways. They grasp different dimensions and appearance forms of knowledge, as well as emphasize its different role in economic and regional growth and development. Endogenous growth theory, new institutional and evolutionary economics, as well as their regional concerns are relevant by explaining the relations of knowledge and economic/regional development.

Endogenous growth theory as well as new institutional and evolutionary approaches acknowledge that innovation is influenced by numerous local factors. Out of them, first of all the qualitative factors – knowledge base and institutions – are region-specific, thanks to their path-dependend development process. These factors mean and generate actually the main differences between regions, which cannot be equalized in the short run. It follows that qualitative dimensions of knowledge – on the contrary to the standard production factors – could not be homogenized in the age of globalization as well. Moreover, their immobility and individual characteristics upvalue the role of spatial proximity and underpin regional competitiveness and development. According to these all, my first hypothesis can be regarded as proven: it can be really stated that *knowledge has been playing a more and more important role between the influencing factors of regional growth and development (T1).*

Thus, recent theories stress that personal interactions and communication play a more and more important role in the knowledge creation process. Based on these approaches, a border region could be dynamized and developed through the coevolution process of space, milieu and knowledge. Universities as knowledge creators and regionally embedded institutions may have key role in this process. In case of the Austrian-Hungarian border region it was assumed that universities do not use totally the cooperation possibilities arising from their geographical proximity. My study concludes that West-Trandsanubian higher educational institutions should develop their own internationalization strategies and broaden their international relations in a more conscious way. Furthermore, a rise in the education quality including language skills would also considerably contribute to the development of the border region. To sum up, it can be stated that the development of the Austrian-Hungarian border region could be dynamized by bracing the mentioned knowledge flows, and by using the reserves of the border region.

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