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THE ROLE OF UNIVERSITIES IN DEVELOPMENT

Zsófia DUGA, Krisztina SZONTÁGH
University of Pécs, Faculty of Business and Economics, Hungary
zsofiaduga@yahoo.com

ABSTRACT

Innovations play a more and more important role in the economic development of each region. The success of the regions' developmental strategy depends in large part on resources and the geographic location of those resources within the region. Universities play a definitive role in regional development. The University of Pécs is one of the largest and most popular higher education institutions in Hungary. Over 32,000 students study at its ten faculties and its staff numbers more than 6,000. As reflected in the number of its faculties, the University embraces almost the full spectrum of higher education. It includes training programmes in law, health care, economics, natural sciences, humanities, technology, arts, pedagogy, and adult education. There are over 100 majors and specialties that preserve traditional forms of training while adapting to better suit current social and economic needs. The university, as a key participant in economic life and development, can help foster cooperation in the business sphere and assist local municipalities and the central government in regional development programmes. In my presentation I wish to introduce the role of the University of Pécs in the development of the Transdanubian Region and the ways it may join in regional development programmes through education, research, and scientific activity.
Keywords: region, universities, companies, innovation, R&D

INTRODUCTION

The role of human resources has become more important in today's knowledge-based society. The *new economic model* that fulfils and replaces the industrial-postindustrial economy and money economy is called *knowledge-based economy*. The most important driving force of economic growth and productivity in a knowledge-based economy is *knowledge*, which, as an intellectual capital, is primarily incorporated in technology and the human being. The term "knowledge-based economy" derives from discovering and acknowledging the effects that knowledge and technology have on *economic growth*. Production processes of the knowledge-based economy are based on the exploitation and distribution of information and knowledge. The knowledge-based economy is invariably a market economy and its most important coordination factor is the knowledge market. In the knowledge-based society, increase in welfare, performance and employment is influenced by the dynamic development of knowledge intensity and high technology. The first step of the alteration in the postindustrial economic model: Leaving its own medium, the modern economy renders *non-economic subsystems* (education, healthcare and society, etc.) parts of the economic subsystem. The second step of the alteration: Leaving its own medium, knowledge production occupies the *economy* that embraces almost everything;

therefore, the economy is now controlled by the knowledge market. The knowledge-based economy cannot exist without the knowledge-based society, and vice versa; furthermore, knowledge production, the knowledge-based economy and the knowledge-based society also act as one another's driving forces (*Varga*, 2011).

While completed knowledge was important in industrial societies previously – that is, the goal was to acquire life-long knowledge -, it has completely changed by these days. Nowadays knowledge is not a goal but means of integrating into society successfully. Since knowledge can become outdated, continuous life-long learning is necessary. Competitiveness of economies and the pace of their development are essentially influenced by the quantity and quality of human resources. *Rédei* (2007) draws the following conclusion in her study: the unceasing technological and technical development is dominant in the knowledge-driven economy, which requires labour force with new skills of application. Labour force is required to continuously acquire new skills for new technologies, which is implemented by lifelong learning. All kinds of learning are valuable since they not only convey professional knowledge but also teach people how they can acquire new knowledge and maintain their desire to update their knowledge. The issue of "how you should learn" can be used later to implement tasks offering new social and economic advantages. She thinks that every kind of knowledge - not only the one acquired in formal education - which people acquire during their lives should be considered to be valuable.

It is the universities which are key institutions of teaching, training and further training of human resources required in societies. The success of regional development strategies of a region depends to great extent on available resources and their locations in the region. The role of universities and colleges is crucial considering regional development. There are seven NUTS 2 regions in Hungary and one of them is the South Transdanubian Region, which comprises Baranya County, Tolna County and Somogy County. There are three higher education institutions in the South Transdanubian Region: the University of Pécs, the University of Kaposvár and the Pécs Episcopal College of Theology; and there are higher education institutions also in Szekszárd and Paks. However, it is only the University of Pécs (UP) that is among the largest and most popular universities of Hungary. In our study, we will try to answer the question whether universities as key actors of economy and economic development can contribute to the cooperation of the business sector and the competitive sphere in regional development programs and if they can how it is possible.

FUNCTION CHANGE OF UNIVERSITIES

Universities have been playing an important role in the developments of regions, the creation and distribution of economic and social innovations since the Middle Ages. The first universities were established at the turn of the 12th and 13th centuries (Paris and Bologna). During that time, the majority of universities operated in the middle regions of the Italian Peninsula. The first universities in Central Europe were founded slightly later, around the middle of the 14th century – somewhat falling behind Western Europe – in Prague in 1348, in Krakow in 1364, in Vienna in 1365 and in Pécs in 1367. At the beginning of the 16th century, there were approximately 70 universities, the

majority of which could be found in areas belonging to today's France, Italy, Germany and Spain. "Regional relationships between universities were restricted to only finance. The institutions supported by town capital played important roles in disseminating humanistic culture beyond regional borders. Their connections with economy were contingent, even though German universities contributed to the development of the printing industry to a great extent" (*Horváth*, 1994).

The 17th and 18th centuries saw significant changes, which resulted in the breakdown of the existing order and the transformation of the economic and political system. Modern civil states with rational rule of law and bureaucratic organizations developed; furthermore, the church and the state became separated. During this period, the centralizing states consciously strove to strengthen the state influence on universities (financing, the right to establish and the right to appoint) and weaken the regional connections. This was successful in France and in Prussia; however, universities failed to be made completely dependent of states in Great Britain and in Switzerland. In Hungary, the autonomy of universities was a question under constant debate in the Era of Dualism. The independence of universities in personal and economic matters became more and more restricted by the 1910s due to the intensive centralization effort of states. In the era after World War II, the centralization effort intensified, so a great proportion of the teaching and research concentrated in a small number of institutions. Central governments tried to control universities with direct methods. Mass education changed the elite training in West Europe from the beginning of the 1960s and in Hungary from the beginning of the 1990s. Universities more often considered the demands of the society and economy in the course of their trainings. A strong decentralization process started, which resulted in a diversified system of tertiary education institutions. The number of universities and colleges increased, the training offers widened and the institutions strove to take regional requirements into account when they were established. *The relationship between universities and their environment goes back centuries. It is primarily based on economic interests and the intensity of the relationships varies from region to region. My experience is that different types of cooperation have been more frequently formed between higher education institutions and economic actors of regions in the past years.* What can be the reason for this? It is partly the fact that the functions of universities have refined and widened. Today, the scope of their activities does not only involve the classic basic functions such as teaching and research, but it has also changed and has been supplemented with a third, extremely important function, the social engagement. This third function includes every institutionalized relationship, which was established between universities and actors of economy and social life, which cannot be restricted simply to the economic distribution of knowledge elements. *In conclusion, nowadays university activities are said to include "consigning new competences from trainings based on research to economic actors, possessing the new technology knowledge (patents and other intellectual rights), the utilization of this knowledge within universities (establishing university spin-off companies) and outside them (companies and public institutions), furthermore, contribution to development policies (including participation in consultancy bodies), social engagement in the immediate regions of universities, meeting local requirements and operating as the intellectual centres of the regional labour force market and local societies*" (*Farkas*, 2009).

Universities have to adapt to changing requirements and conditions since they are expected to persist in the international competition. Consequently, the number of entrepreneurial universities, besides the traditional service universities, has been on the rise recently. Entrepreneurial universities were first established in the 1990s. This is the era when tertiary education transformed to become mass education and the competition for students and resources started. The Government could no longer finance the expanded higher educational sphere effectively. Universities recognized that they should supplement their income provided by the Government from other sources. They strove to integrate into their social and economic environment. Owing to these changes, there has been an approach between the business sector and universities. Service universities not only offer traditional training forms but also vocational trainings and postgraduate programs flexibly adapting to the demands of external customers. Planning and organizing research and contracting are coordinated centrally, and units and researchers identify their places within this system. Usability and profitability are of great importance when research, development and innovation themes are being specified. The supervising power is shifted to the management level – it is not only the professorial bodies that can make decisions. A more radical type of the service university is the entrepreneurial university. The entrepreneurial university establishes strong and professional management and creates so-called developmental peripheries (industrial, business and technological parks), its finance is diversified, its income derives from different sources (secondary and tertiary financing sources are of great importance), it has strong and stimulated academic background, academic and business interests prevail together, traditional values persist within the entrepreneurial university and the entire university is influenced by entrepreneurial culture (*Hrubos*, 2004).

The importance of university engagement can be claimed to have been modified several times during history. Turning points are represented by so-called academic revolutions, which had some consequences. During the first revolution, the ancient teaching tasks of universities were complemented with scientific research and the result of the second revolution was that the increasing number of tasks required expanding social responsibility so that the economic and social utilization of tasks can be implemented. Universities, however, are expected to be able to handle the crisis due to the continuously increasing number of students and the intensifying financing difficulties if they have themselves accepted by the society of their countries and local environments, they conduct activities which are considered to be useful, they convey realistic knowledge and produce research results that can be applied in practice. In order to be able to adjust to the changes flexibly, higher education institutions have to adopt a new approach and they have to find their new social functions (*Mezei*, 2008).

RELATIONSHIP BETWEEN UNIVERSITIES AND THE CORPORATE SPHERE

Basic conditions of international competitiveness can be established by the quality of regional and local resources, which is largely supported by knowledge and services related to it. "*Relationships and cooperation between actors of the innovation system in*

knowledge-based societies are indispensible in the process of obtaining, accumulating and disseminating knowledge. Therefore, universities play an increasingly larger role in the social and economic development through the expansion and dissemination of academic knowledge" (*Inzelt,* 2004). This statement exemplifies that local universities have had crucial roles in the evolution of several high technology regions (Silicon Valley and regions around Cambridge and Boston). In Hungary, in contrast with these, innovation centres established in the past decades or still being formed, which are heavily concentrated territorially (Budapest, Debrecen, Szeged, Pécs and Veszprém), were founded as a result of determined and purposeful economic policy intervention.

Companies and universities could cooperate successfully on mutual benefit platform if there were continual discussions between them, where the expectations, demands and opportunities could be harmonized better. It should be clarified what expectations of economic actors have in connection with universities, and which of these expectations universities can meet. It can be concluded that today's universities mostly collaborate with foreign-owned companies. Considering the data of the Central Statistical Office (CSO) of 2005, it could be observed that there were 1,566 research centres whereas the number of research and development centres of enterprises was 749. The R+D expenditure of foreign-owned companies made up HUF 65.5bn in 2005. On the basis of the headcount data, it can be concluded that 54% of the 7,393 R+D employees registered at corporate research centres worked for foreign-owned companies (*CSO,* 2006).

When the field of research and development is studied, future university researchers and the disciplinary distribution of their activities should be analyzed as well. Universities conduct research and development activities through the productive activities implemented in the course of doctoral trainings. Therefore, it is the doctoral trainings that ensure the basis of future research and productive human resources of universities.

It is a worthwhile task to examine what kind of relationship exists between participants of the economic sphere and universities. *Two dominant types of connection exist between companies and universities: one of them is specialists' training and their further training and the other one is the research – development activity. Varga* (2000) claims that university knowledge transfer mechanisms can be divided into four categories:

- conveying knowledge flow
- knowledge transfer due to the relationships (formal and informal) and networks of university experts and their corporate counterparts
- knowledge diffusion through formalized business connections (spin-off companies)
- knowledge transfer through/by physical facilities (libraries and scientific laboratories) of universities which are used by industrial companies

Analyzing the connections between universities and the corporate sphere is of great importance considering what added value the knowledge acquired at universities – either during graduate or postgraduate training programs – and on corporate level will represent in the future lives of the people who have obtained degrees. If their knowledge is up-to-date – which can be presupposed in case of universities with active corporate connections – their degrees and knowledge can be considered more valuable from

the viewpoint of finding employment in the economic corporate sphere. Therefore, universities with active and continuous corporate connections can ensure further labour market opportunities for their students.

Studies investigating collaborations between universities and companies pay special attention to the various channels of knowledge transfer (e.g. mutual publications, involving corporate experts into university trainings, companies established by teachers regularly hired as experts and short-term or long-term research commissions for universities). Cohen emphasizes the importance of formal public channels (academic publications, workshops and conferences), whereas others enhance the significance of informal relationships.

One of the essential connection forms between actors of economy and universities is when universities strive to take the demands of the economic sphere into consideration in the development of their training offers. Qualified labour force and life-long learning play a crucial role in today's knowledge-based society. Highly qualified labour force means a significant competitive advantage, whereas narrow and profession-specific knowledge is no longer sufficient for maintaining long-term competitiveness. The demands of economic actors are diverse; however, it can be concluded that well qualified specialists are needed.

The other important connection between economic actors and universities evolves during research and development collaborations. In Hungary, there are several examples of collaborations between companies and universities; however, it is the small and medium-sized enterprises which primarily wish to find opportunity for collaboration. Large companies are mostly not interested in applied research but usually want to use a service since they strive to achieve high return on low capital investment. *This type of cooperation has several advantages for both partners:* universities are capable of expanding their limited financial resources, talented students can come into contact with the corporate sphere and companies can gain competitive advantage and make profit as a result of their cooperation. The main benefit of the R&D activities conducted at universities is that the latest scientific results can be integrated into teaching directly, they can become essential parts of the study material and they are published. On the other hand, several problems might arise during the collaboration. *One of the most significant problems is that corporations support research because* they wish to increase both their profit and their competitiveness. Since basic research can take a long time and their possible outcome is uncertain and risky, companies direct universities towards applied and developmental research. *The other crucial problem is the issue of patents.* If researchers' new scientific results are patented by corporations, researchers do not receive anything from the profit, they receive the payment recorded in their contract. Consequently, researchers might concentrate on technological developments and consultancy instead of basic research that can be more profound and longer and has uncertain results. In the United States, it was already realized in the 80s that supporting connections between universities and corporations and encouraging basic research were necessary. For this purpose, patent acts were modified significantly. Universities have disposal of the intellectual properties created during research financed by governments. Universities can make use of the intellectual property commercially

and they have to distribute the royalty from patenting an invention among the inventors, who are generally teachers, researchers and spin-off companies hired by the given university.

In Hungary, a new program "The applied research and development programme" was launched in 1995. That was the first engagement of the state sphere to support the evolution of systems of connections between corporations and universities. In 1999, a program assisting the establishment of Cooperation Research Centres (CRC) was launched with the purpose of strengthening the relationships of higher educational institutions, research institutes and companies by founding research consortiums. In the framework of the CRC program, five centres were established in 2001: two in Budapest and one in Miskolc, Pécs and Veszprém. For the sake of reforming the financing and regulation background of innovations, the Act on Research and Technological Innovation Fund was passed in 2003 to regulate financial issues. In 2004, a new act on research-development and technological innovation was passed to regulate the general framework of R&D&I activities; furthermore, the Government's medium-term (2007-2013) strategy for science, technology and innovation was also accepted. It was in 2004 that the National Research and Technology Office first announced a tender whose objective was to establish Regional Knowledge Centres, which conduct outstanding research – development and innovation activities, cooperate with representatives of the corporate sphere and encourage the technological and economic development of the regions, improving the competitiveness of the country.

For example in Hungary, a new knowledge centre, which will also satisfy international standards, is to be established in the Zsámbék Basin in the framework of the Talentis Program. The economic, innovative and scientific centre, which would be similar to the Californian Silicon Valley and the European Grand Lyon and Sophia Antipolis, would concentrate the financial and intellectual resources in one place. The government, which joins the project as the owner, acts as a catalyst, which might accelerate the creation of a knowledge region. The three main pillars of the Talentis Program are: research and development, education and technology, which cooperate beneficially with the development of the infrastructure and improvement of life quality. One of the largest logistics centres, the Agrogate Hungary, has been built also in the Zsámbék Basin. The first environmental conscious and suburban industrial park and innovation centre, the Talentis Business Park and Innovation Centre involving micro-, small and medium-sized enterprise, also operates here. Several development projects that have been implemented within the Program satisfy the ever-increasing requirements of the local community: for example, the M1 motorway and its expansion and the renovated school, which has been expanded with a library, a restaurant and a computer laboratory. The expansion of the intersection in Herceghalom, the establishment of settlement/regional sewage treatment works, the new health house and the renovation of the kindergarten are further examples of the development projects. All these investments and developments result in a regional development program, which might be a role model in the Carpathian Basin (*Fellegi,* 2011).

The collaboration of the state sphere, the corporate sphere and universities is required to make the economy of a country competitive. The Triple Helix, a model devised by Etzkowitz and Leydesdorff, was created during the analysis of the subsystems of the knowledge-based economy in the era following World War II. On the basis of their own observations, Etzkowitz and Leydesdorff found that three institution types were of great importance considering the examination of the evolution of knowledge (*Inzelt,* 2004):

- universities as knowledge producing and knowledge disseminating organizations (according to the model, academic research institutions also belong to this type),
- governmental research organizations as organizations conducting controlled basic research and applied research and
- innovation enterprises.

The tightness and intensity of the collaboration of the three institution types determine the innovation system of a given country, region or sector. The Triple Helix model is an analyzing and normative model, which can help to describe what relationship the government has with the corporate sphere and representatives of universities. The essential question for countries lagging behind is not how intensive the co-movement in accordance with the triple helix is but if there are any connections between the three institutions. The model includes three main elements:

1. "In a knowledge-based society, universities have a more distinguished role in the innovation system than governments or companies. If the government has leadership, there will be limited sources for the support of innovation activities. If the government does not take part in the innovation processes, there will be deficiency in the necessary regulation and support.
2. The connection between the three main institutional spheres tends to move towards a cooperative connection. Innovation policy does not manifest itself in regulations deriving from the government unilaterally, but instead, the government, the industry and universities work together to create an appropriate regulatory system.
3. All three actors fulfill their traditional roles; however, they take actions in the areas of the other two actors. For example, universities can take over the lead from the government in case of certain development projects. Universities, which provide human resources and knowledge of increasingly better quality, have evolved to be influential social and economic actors" (*Dzisah and Etzkowitz,* 2008).

If Triple Helix is considered to be a normative model, the prerequisite of the circulation of people, ideas and innovation is the proper adaptation of the model to different national and cultural environments. The first step of this is to ensure the opportunity for the relevant actors to discuss honestly and overtly their strengths, weaknesses and factors hindering their cooperation. The second step is to identify the opportunities as well as the limits and obstacles to be overcome as precisely as possible. The third step is to elaborate an action plan which adapts the organizational models or discovers new ones (*Dzisah and Etzkowitz,* 2008).

RESEARCH – DEVELOPMENT IN DOCTORAL TRAINING – SOUTH TRANSDANUBIAN REGION

This chapter examines how new generations of researchers are ensured in the South Transdanubian Region. The "Bologna Seminar" on Doctoral Programmes for the European Knowledge Society provided the first major forum to discuss the new Action Line in the Bologna Process entitled "European Higher Education Area (EHEA) and the European Research Area (ERA) – Two Pillars of the Knowledge-based Society". The main outcome of the Salzburg Seminar "dialogue" on the third cycle was to reach agreement on the establishment of a set of *"ten basic principles"* that should underpin further considerations of the key role of doctoral programmes and research training in the Bologna Process. Further work and analysis was required in order to encompass fully the great variety and experience of doctoral programmes and research training schemes, including both the opportunities and barriers, and to develop the "ten basic principles" into a set of recommendations (*Christensen,* 2005).

The "ten basic principles" are presented together with the main points discussed in both the Salzburg plenary and working group sessions. These points identify the key challenges that have to be faced in seeking to achieve consensus-building on future recommendations (*Christensen*, 2005):

1. The core component of doctoral training is the advancement of knowledge through original research. At the same time it is recognised that doctoral training must increasingly meet the needs of an employment market that is wider than academia.
2. Embedding in institutional strategies and policies: universities as institutions need to assume responsibility for ensuring that the doctoral programmes and research training they offer are designed to meet new challenges and include appropriate professional career development opportunities.
3. The importance of diversity: the rich diversity of doctoral programmes in Europe – including joint doctorates – is a strength which has to be underpinned by quality and sound practice.
4. Doctoral candidates as early stage researchers: should be recognised as professionals – with commensurate rights - who make a key contribution to the creation of new knowledge.
5. The crucial role of supervision and assessment: in respect of individual doctoral candidates, arrangements for supervision and assessment should be based on a transparent contractual framework of shared responsibilities between doctoral candidates, supervisors and the institution (and where appropriate including other partners).
6. Achieving critical mass: Doctoral programmes should seek to achieve critical mass and should draw on different types of innovative practice being introduced in universities across Europe, bearing in mind that different solutions may be appropriate to different contexts and in particular across larger and smaller European countries. These range from graduate schools in major universities to international, national and regional collaboration between universities.

7. Duration: doctoral programmes should operate within appropriate time duration (three to four years full-time as a rule).
8. The promotion of innovative structures: to meet the challenge of interdisciplinary training and the development of transferable skills.
9. Increasing mobility: Doctoral programmes should seek to offer geographical as well as interdisciplinary and intersectoral mobility and international collaboration within an integrated framework of cooperation between universities and other partners.
10. Ensuring appropriate funding: the development of quality doctoral programmes and the successful completion by doctoral candidates requires appropriate and sustainable funding.

The Salzburg Seminar participants recommended to the Bologna Follow-Up Group (BFUG):

- that the above ten basic principles provide the framework for further work on the third cycle, and consequently are fed into the drafting of the Bergen Communiqué;
- that the Ministers in Bergen then call on the European University Association through its members to prepare a report under the responsibility of BFUG on the further development of these principles to be presented to Ministers in 2007 (*Christensen,* 2005).

Essential conditions for sustainable development are the continuous trainings of researcher staffs of appropriate structure, quality and quantity as well as active research and productive activities, all of which represent added values in the society. A significant part of the research and development conducted at universities is implemented in the research and productive projects of doctoral trainings. That is why it is important to analyze the constitution of doctoral trainings in the South Transdanubian Region.

The number of students taking part in doctoral trainings in Hungary is shown in the *Table 1*.

Table 1

Participation in Ph.D. and DLA trainings

Number of students in Ph.D. and DLA trainings	**7167**
new entrants	2233
students supported by the Government	3050
students in their final year	2076
foreigners	524
women	3488

Source: *Szontágh*, 2010

The following table, with the South Transdanubian Region in the focus, shows the number of students in the region participating in Ph.D. and DLA trainings at the University of Kaposvár and the University of Pécs compared to the total number of

students in higher education. On the basis of this, it can be concluded that the number of students in Ph.D. and DLA trainings is quite high compared to the total number of students in higher education (361 347 students) (*Table 2*).

Table 2

Participation in Ph.D. and DLA trainings in the South Transdanubian Region

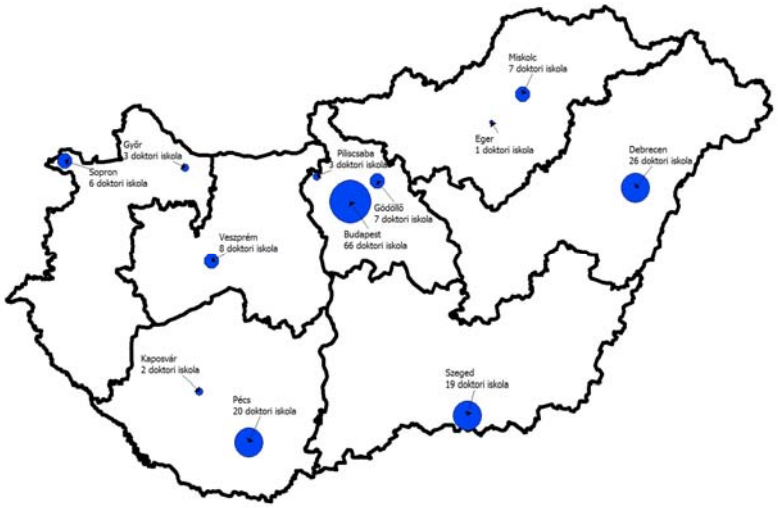
Name of the institution	Total number of students	Number of students in Ph.D. and DLA trainings
Kaposvár University	52	3 244
University of Pécs	859	29 032

Source: *Szontágh,* 2010

There are 167 accredited doctoral schools at 27 universities in 7 regions of Hungary in 2011. The regional distribution of their locations is uneven (*Figure 1*). There is one university in most of the regions whereas 18 universities can be found in the Central Hungarian Region and within that, in Budapest and in its immediate surroundings. Hungary is basically Budapest centred, which means that the economic and demographic centre of the country is the capital. In the Figure 1, the centralized spatial distribution can be clearly seen. Two universities, the University of Kaposvár and the University of Pécs, have doctoral schools in the South Transdanubian Region. Two doctoral schools are accredited at the University of Kaposvár and 20 accredited doctoral schools work at the University of Pécs.

Figure 1

Regional distribution of doctoral schools with a valid accreditation certificate in Hungary, 2011



Source: On the basis of *HAC* (Hungarian Accreditation Committee) statistics

When future researchers of universities are analyzed, disciplinary distribution among doctoral schools is worth examining in order that training offers and opportunities of regional research cooperation in the South Transdanubian Region can be understood precisely.

The *Table 3* shows what opportunities the University of Kaposvár and the University of Pécs can provide for actors of the region.

Table 3

Disciplinary distribution among doctoral schools with a valid accreditation certificate in 2011, in the South Transdanubian Region

Institution	Name	Discipline
Kaposvár University KU	Doctoral School of Animal Studies	animal studies
	Doctoral School for Management and Business Administration	management and business studies
The University of Pécs UP	Doctoral School of Legal Studies	legal studies
	Doctoral School of Chemistry	chemistry
	Doctoral School of Pharmacology	pharmacology
	Doctoral School of Interdisciplinary Medical Sciences	theoretical medical studies
	Doctoral School of Clinical Medical Studies	clinical medical studies
	Doctoral School of Theoretical Medical Studies	theoretical medical studies
	Doctoral School of Linguistic Studies	linguistics
	Interdisciplinary Doctoral School	ethnography and cultural anthropology, political studies, history
	Doctoral School of Literature Studies	literature studies
	Doctoral School of Psychology	psychology studies
	Doctoral School of Management	management and business studies
	Doctoral School of Regional Policy and Economics	management and business studies, economic studies, regional studies
	Faculty of Arts Doctoral School of the University of Pécs	arts, music
	Doctoral School of Earth Sciences	earth sciences
	Doctoral School of Biology	biology
	Doctoral School of Philosophy	philosophy
	Breuer Marcell Doctoral School	architecture, civil engineering studies
	Doctoral School of the Faculty of Health Studies	health studies
	Doctoral School of Physics	physics
	Doctoral School of Education and Pedagogy Studies	pedagogy studies

Source: On the basis of *MAB statistics*, 2011

In conclusion, the South Transdanubian Region with its 22 doctoral schools to ensure future researchers is the 3rd considering the figures of doctoral schools. Furthermore, the analysis of their training offers, it can be seen in the above tables and diagrams that these schools conduct research and productive activities in several disciplines, which might involve opportunities for significant research cooperation with the industry.

RELATIONSHIP BETWEEN THE SOUTH-TRANSDANUBIAN REGION AND THE UNIVERSITY

Owing to its geographical location, the South Transdanubian Region is the southern gate of Hungary. It is an important factor in foreign affairs as it has opportunity to join the cooperation of south and south-west countries through Croatia towards the Adriatic. Despite its varied natural features, pleasant climate and outstanding tourist features, Baranya County is considered to be one of the underdeveloped counties both in national and international comparisons. The deteriorating position of the county can be related to its economic structure. The South Transdanubian Region, to which the county belongs, is above the national average in some traditional production branch areas such as agriculture, game keeping, forestry and fishery, furthermore, in certain industrial branch areas such as electricity, gas, steam and water supply. Industry and within that the processing industry – even though it is the second most significant sector in the region – plays a less significant role in the achievement of the region than what is typical nationally. The performance of the service sector of the region was more considerable than that of the country in the fields of public administration, defence, education, healthcare, social work services, accommodation and catering services. The R&D activities of the region are less significant than those of more developed regions (*CSO*, 2006).

At the University of Pécs, there are several research centres, which have been explored and analyzed. Consequently, the recommendable research and service portfolio of the university is available for companies. The market-oriented research activity is intensifying, that is why the South Transdanubian Cooperation Research Centre has been established. Its task is to convey interdisciplinary research in the fields of natural sciences and technical studies – laser, biomechanics, molecular biology, cell biology and informatics - to the economic sphere. The Mediopolisz Regional University Knowledge Centre, which conducts research in the fields of drug development and drug production in cooperation with pharmaceutical companies, has been operating successfully. The Pécs Health Science Innovation Centre will be established with the cooperation of the University of Pécs, the Pécs Innovation and Technology Development Centre and local biotechnological enterprises in the near future in the fields of life sciences and medical biotechnological research, which traditionally have strong innovation potentials. This can be the most important research infrastructure development of the past years. The main purpose of the centre is to connect enterprises, market-based product development and the research sphere serving the orders of manufacturers

and distributors and involving the enterprises of Biotechnological Innovation Cluster from the fields of medical biotechnology, pharmacology, nutrition studies, and development of implants, instruments and tools. In consequence of these facts, the university sphere can be considered to be the largest potential knowledge and value producer in the South Transdanubian Region.

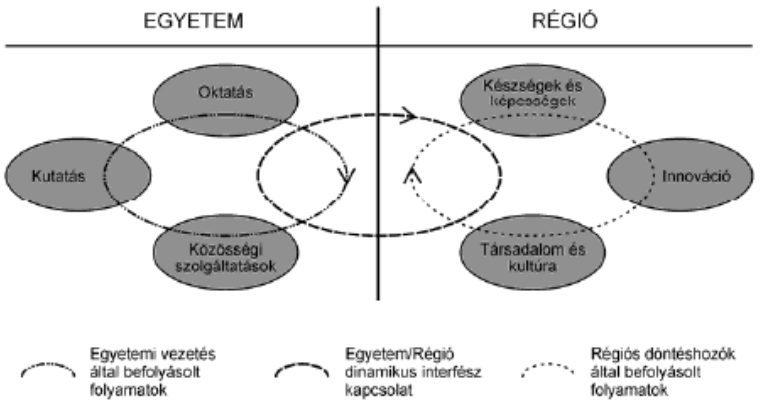
CONCLUSION

Today cooperation between universities and the corporate sphere is contingent. The reason for this is, on the one hand, the weakness of the business sphere and, on the other hand, the lack of necessary openness of universities. Limited financial resources and the lack of regulations also render the situation more difficult. When relationships between universities and companies are analyzed, it is revealed that mostly multinational and foreign owned companies wish to establish cooperation with universities. Besides this, it is also interesting that the majority of the commissions are aimed at using the services provided by universities and solving technical and professional problems to be resolved fast.

Godard (1999) created the model of the interference of the university and the region (*Figure 2*), in which he concluded that a more significant contribution of universities to the regional development was that they were able to establish, coordinate and harmonize connections between certain processes.

Figure 2

A model of the interference between the university and the region



Source: *Goddard*, 1999, 8. p.

(Egyetem = University, Oktatás = Teaching, Kutatás = Research, Közösségi szolgáltatások = Community services, Régió = Region, Készségek és képességek = Skills and capabilities, Innováció = Innovation, Társadalom és kultúra = Society and culture, Egyetemi vezetés által befolyásolt folyamatok = Processes influenced by the university management, Egyetem / Régió dinamikus interfész kapcsolat = University / Region dynamic interface connection, Régiós döntéshozók által befolyásolt folyamatok = Processes influenced by regional decision makers)

REFERENCES

Bakács, A. (2006): Ipari-egyetemi kapcsolatok. Budapest : MTA Világgazdasági Kutatóintézet. [online] < URL: http://www.vki.hu/technologia/mec_8_ipar_egyetem.pdf> [14-04-2010]

Christensen, K.K. (2005): Bologna Seminar. Doctoral Programmes for the European Knowledge Society. [online] <URL: http://www.eua.be/eua/jsp/en/upload/Salzburg_Report_final.1129817011146.pdf> [16-09-2011]

Dzisah, J., Etzkowitz, H. (2008): Triple Helix Circulation: the Heart of Innovation and Development. In: International Journal of Technology Management and Sustainable Development, 7. 2. 101-115. p.

Dőry, T. (2005): Régiók és nagyvárosok innovációs potenciálja Magyarországon. Pécs – Győr : MTA RKK, 27-35. p.

Etzkowitz, H., Leydesdorff, L. (1997): Introduction: Universities in the Global Knowledge Economy. In: Etzkowitz, H., Leydesdorff, L. (eds.): Universities and the Global Knowledge Economy: a Triple Helix of University-Industry-Government Relations. London and Washington : Printer

Farkas, K., Vilmányi M. (2009): A felsőoktatási intézmények szerepének változása. [online] <URL: http://www.tankonyvtar.hu/konyvek/avir-kezikonyv/avir-kezikony> [14-04-2011]

Fellegi, T. (2011): Célegyenesben a magyar Szilícium–völgy. [online] <URL: http://www.hirextra.hu/2011/02/17/celegyenesban-a-magyar-szilicium-volgy/> [16-10-2011]

Goddard, J. (1999): The Response of HEI's to Regional Needs. [online] <URL: http://www.oecd.org/dataoecd/53/6/40033173.pdf > [14-04-2011]

Grosz, A. (2005): Régiók és nagyvárosok innovációs potenciálja Magyarországon. Pécs-Győr : MTA RKK, 248-259. p.

Horváth, Gy. (1999): Kutatás, felsőoktatás és regionális átalakulás. Az innováció szerepe a regionális fejlődésben. In: Magyar Tudomány, 4. 447-458. p.

Hrubos, I. (2004): Gazdálkodó egyetem – Szolgáltató egyetem – Vállalkozó egyetem. Budapest : Új Mandátum Könyvkiadó

Inzelt, A. (2004): Az egyetemek és a vállalkozások kapcsolata az átmenet idején. In: Közgazdasági Szemle, 51. 9. 870-890. p.

Központi Statisztikai Hivatal (2006): Kutatás és fejlesztés 2005. [online] <URL: www.nih.gov.hu/english/statistics/research-and-development-080519-7> [14-04-2011]

Kerékgyártó Gy. (2006): Az innovációs folyamat főszereplői. Budapest : Magyar Tudomány 4. 458. p.

Lengyel, I., Lukovics M. (szerk.) (2008): Kérdőjelek a régiók gazdasági fejlődésében. Szeged : JATEPress, 13-25. p.

Lengyel, I. (2000): A regionális versenyképességről. In: Közgazdasági Szemle, 12. 962-987. p.

Magyar Felsőoktatási Akkreditációs Bizottság (2011): Akkreditált Doktori Iskolák (PhD/DLA) intézmények szerint. [online] <URL: http://www.mab.hu/a_listak.html> [12-01-2011]

Mezei, K. (2008): Az egyetemek szerepe a regionális gazdaságfejlesztésben. [online] <URL: http://www.rphd.ktk.pte.hu/files/tiny_mce/File/Vedes/Mezei_Katalin_tezisfuzet.pdf > [12-04-2011]

Nárai, M. (2005): Az egyetemi profilalakítás és a tudástranszfer szerepe a regionális együttműködésben. UNIRÉGIÓ Egyetemek a határ menti együttműködésben. Pécs-Győr : MTA RKK

Nemzeti Erőforrás Minisztérium (2009): Felsőoktatási Statisztikai Kiadvány. [online] <URL: http://www.nefmi.gov.hu/miniszterium/oktatasi-statisztikak/felsooktatasi-statisztikai-kiadvany-2009 > [12-02-2011]

Nemzeti Erőforrás Minisztérium (2011): Statisztikai gyorstájékoztató a 2010/2011-es tanév eleji adatgyűjtés előzetes adataiból – Felsőoktatási statisztika. [online] <URL: http://www.nemfi.gov.hu/letolt/statisztika/stat_gyorstaj_felsoo_101210.pdf> [12-02-2011]

Polónyi, I. (2009): Zsákban táncolva, avagy az egyetemi innovációs stratégia sajátosságai.

Rédei, M. (1995): A magasan kvalifikált emberek mozgása. In: Munkaügyi Szemle, 39. 1. 21-27. p.

Rédei, M. (1997): A képzett munkaerő mobilitása. In: Gazdaság – Vállalkozás – Vezetés, 4. 19-28. p.

Rédei, M. (2002): Információs és tudástársadalom. In Bernek, Á. (eds.): A globális világ politikai földrajza. Budapest : Nemzeti Tankönyvkiadó, 330-354. p.

Rédei, M., Kobolka I. (2007): A mobilitással a szellemi tőke növelhető. Aki a gondolatokat tettre váltja. Pécs : PTE FEEK, 239-245. p.

Rédei, M. (2011): A térbeli mobilitással a szellemi tőke növelhető. Budapest : Nemzetközi Felsőoktatási Kutatások Központja, Corvinus Füzet 6. 31-43. p.

Varga, A. (2000): Local Academic Knowledge Spillovers and the Concentration of Economic Activity. [online] <URL: http://66.102.1.104/scholar?hl=hu&lr=&q=cache:D2LSNRWOs3AJ:www.ersa.org/ersaconfs/ersa98/papers/493.pdf+Varga+Attila+Local+academic+knowledge> [12-02-2011]

Varga, Cs. (2011): A három alapfogalom. [online] <URL: http://www.inco.hu/inco9/kozpont/cikk0h.htm> [16-10-2011]