

**UNIVERSITY OF PÉCS**  
**FACULTY OF NATURAL SCIENCES**  
**Doctoral School of Geosciences**

**PHD DISSERTATION THESES**

**CONNECTION BETWEEN INNOVATION  
ENVIRONMENT AND SOCIAL CAPITAL  
INNOVATION SURVEY IN SOUTH  
TRANSDANUBIA**

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## 1. REASON FOR THE TOPIC AS A THESIS, GOALS TO ACHIEVE

Factors and resources aiming how to increase national income have been studied and searched for a long period of time but the great majority of the questions have not been answered for nearly a century and they are in the focus of debates about economy even today. The unclear questions on the topic can be grouped into four categories<sup>1</sup>:

- resources and factors of national income (GDP)
- economic role of innovation
- practical methods of analysing connections between GDP and innovation
- databases applicable for different methods

Several books have been published<sup>2</sup> in order to make an effort to reveal the resources of innovativity. Although these studies are based on different databases and they work with different approach, they determine even the fundamental unit of the analysis in a different way. It is *unanimously stated by all of them that innovation is the key factor to improve international competitiveness, economical growth and the rise the standards of living*<sup>3</sup>.

According to the above mentioned development of the innovation activities in a country and its promotion will improve economic efficiency and performance. Due to the research the success does neither depend on the private source employed for the innovation nor on the amount of subsidy but first of all *it does depend on the environment surrounding innovation, the 'innovation milieu'*<sup>4</sup>.

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<sup>1</sup> PAPANÉK G. 2003: *Az innováció hatása a nemzeti jövedelem növekedésére*. In: Pakucs J. – Lóránt K. (szerk.) *Az innováció hatása a nemzeti jövedelem növekedésére*, MISZ, Budapest, pp. 109-111.

<sup>2</sup> Among others some in Hungarian:

INZELT A. 1998: *Bevezetés az innováció-menedzsmentbe. (Az innováció közgazdaságtana és a technomenedzsment kapcsolata)* Inzelt A. (szerk) Műszaki Könyvkiadó, Budapest, 324 p.

RECHNITZER J. 1998: *Területi stratégiák*, Dialóg Campus Kiadó, Budapest, 348 p.

PAPANÉK G. (szerk.) 1999: *A magyar innovációs rendszer feltárása* OMF, Budapest, 149 p.

HAVAS A. 2007: *A vállalati K+F és innovációs tevékenységek ösztönzésének lehetőségei Magyarországon*. Tudomány- és Technológiapolitikai, Versenyképességi Tanácsadó Testület, Bp. 91 p.

DÖRY T. 2005: *Regionális innováció-politika*, Dialóg Campus Kiadó, Budapest–Pécs, 261 p.

<sup>3</sup> ÁCS J. Z. – VARGA A. 2002: *Geography, Endogenous Growth, and Innovation*, International Regional Science Review, Vol. 25, No. 1, pp. 132-148.

<sup>4</sup> CAMAGNI, P. R. 1992: The concept of innovative milieu and its relevance for public policies in European lagging regions. Paper, presented at the 4<sup>th</sup> World Congress of RSA, Palma de Mallorca;  
MAILLAT, D (1991) *The Innovation Process and the Role of the Milieu*. In: Bergman, E. [et al.] (eds.) *Regions Reconsidered. Economic Networks, Innovation and Local Development in Industrialized Countries*. Mansell, London, New York, pp. 103-118.

Based on statistical data available we suppose that the economic position of South Transdanubia is similar to several rural<sup>5</sup> regions in Hungary and what concerns the human resources of the research and development<sup>6</sup> (R+D) it precedes them. (*table 1.*)

That is why our empirical research is focused on the third important component of the innovation environment, on working out the local networks connected to innovation and on the PTE lecturers and school leaver-students' opinions about the topic as they are regarded to be the most significant local participants by us<sup>7</sup>.

The statement saying<sup>8</sup> that *social capital is needed for network-building serving as a basis for the local cooperation* among others was proven by researchers supported by empiric facts a decade ago<sup>9</sup>.

For the present study the theory is preferred which states that *social capital* derives from the features of the social organizations<sup>7</sup>. These features include such as trust, norms and networks, which can increase the efficiency of the society by promoting harmonized activities. The resources available for us at a regional level have made it possible to reveal the network among the participants involved in the innovation and they have explored the issues like trust and attitude among the characters at the University of Pécs.

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<sup>5</sup> According to the features of the regional innovation systems as they are built up from below and they are directed from outside there are 3 spatial development directions in Hungary. Based on these the innovation of South Transdanubia belongs to the group of the three southern and eastern regions (DA, ÉA, ÉM). (LENGYEL B. 2010: *A tudás-alapú gazdaság területi vizsgálatai Magyarországon regionális innovációs rendszerek és tudásbázis*. PhD-tézisek, 14 p.)

<sup>6</sup> We don't think that there is a direct connection between the regional R+D and the local innovation performance, but it is believed that these Hungarian Central Statistical Office (KSH) data give a lot of information about the present situation. This method is used in economics, e.g when measuring the *total factor productivity*. (RÉVÉSZ T. 2005: *Az innováció egyes típusainak hatása a nemzeti jövedelem növekedésére*. Magyar Innovációs Szövetség [MISZ], Budapest, p. 17.)

<sup>7</sup> Of course PTE, which is one of the biggest Universities in Hungary cannot be regarded as a simple local factor, since its influence is felt in the whole region and beyond.

<sup>8</sup> PUTNAM, R. D. 1993: *The Prosperous Community: Social Capital and Public Life*, The American Prospect, 13 (Spring), pp. 35-42.

<sup>9</sup> KNACK, S. – KEEFER, P. 1995: Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures. *Economics and Politics*, Vol. 7, No. 3, pp. 207–227.  
KNACK, S. – KEEFER, P. 1997: Does social capital have an economic payoff?, *Quarterly Journal of Economics* Vol. 112, No. 4, pp. 1251-1288.

## **2. STRUCTURE OF THE RESEARCH, THE EXAMINED GEOGRAPHIC REGIONAL LEVELS**

The present thesis applies a continuously restricting regional approach to reveal the problem gradually, it analyzes the position of innovation at smaller and smaller geographical levels. It takes the problem apart; and finally presents the particular participating players' behaviour in this way and attempts to point out the main motive power.

### ***Innovation performance in Hungary***

The EU member states' data are compared to Hungary's innovation performance as a comparison level in the first case study of this thesis. We preferred to draw our innovation path compared to the member states.

For the reason mentioned above the performance in the field of innovation in Hungary compared to the other member states has been scientifically investigated in this study. We constructed the 7-year long innovation practice between 2002 and 2008 with the help of the data given in the European Innovation Scoreboard (EIS).

The two goals supposed to be achieved with this secondary analysis are the following:

*In the first place* we would like to present a simplified but clearly arranged, easy-to-follow methodology which is able to eliminate the value differences caused by the annually modified indicators, thus the up-to-date innovation performance of the countries in question and formation of their prospective trends from year to year can be represented in relation with one another in a longer run.

*In the second place* with the help of this methodology we set an aim to determine the position of Hungary compared to the neighbouring countries, including their paths and directions to be expected as we have created and drawn them in the “*relative European innovation practice*”.

Although the original goal of the research was the determination of the innovation improvement-paths in the countries compared to one another based on EIS reports, the annual revision of the analyses and the background studies connected with them presented an opportunity to draw some starting-point conclusions in the subjects below:

- Determining the innovation development trends
- Connection between social capital and trust and innovation performance
- Summarizing the principles of a well-balanced innovation development.

### ***Innovation position of South Transdanubia***

According to the objective facts and the economic statistics the position of South Transdanubia has been declining even within the not too prosperous economy of Hungary. It

can be seen by most data about the regional economy like the GDP-indicators, the average wages in the region, the gradually increasing regional rate of the financial support from abroad (FDI), the amount of the research and investment per company (R+D) (*table 1.*) and the data about the use of procurement resources. Three methods have been applied for the examination of the regional level in order to present a survey about the position of innovation in South Transdanubia, about the achieved level of development and innovation-developing means, which have been applied so far.

In the *first third* of the regional survey the current economic situation of the region, and the main trends have been drafted based on statistic data. This general survey concerning South Transdanubia shows a special contradiction. South Transdanubia is in the first position in the region<sup>10</sup> based on the regional R+D data of 2008 (*table 1.*) in all respects based on human resources – except one criterion<sup>11</sup> – but it is in the last position in terms of financial costs per person.

**Table 1.:** Regionally detailed, Hungarian R+D data (2008)

R+D data of regions In 2008 Source: KSH 2009)	Abbr.	Number of R+D per 100 thousand persons (person)	Number of lecturers, developers per 100 thousand persons (person)	Number of CSc+PhD+DSc per 100 thousand persons (person)	R+D expenditure per person (forint)	R+D expense per person (forint)	R+D investments per person (forint)
<b>South Transdanubia</b>	<b>DD</b>	<b>389,2</b>	<b>229,8</b>	<b>113,9</b>	<b>6 021,7</b>	<b>5 560,9</b>	<b>460,7</b>
North Hungary	ÉM	194,9	131,7	52,2	7 482,6	6 212,9	1 269,6
West Transdanubia	NyD	278,8	188,1	69,4	14 325,5	12 990,1	1 335,4
South Great Plains	DA	377,9	233,9	103,8	14 000,7	12 367,5	1 633,2
Central Transdanubia	KD	236,1	159,8	50,4	13 659,9	11 915,2	1 744,8
North Great Plains	ÉA	328,3	208,5	94,9	17 303,7	14 971,2	2 332,6
Central Hungary	KM	986,4	685,8	252,8	58 877,0	52 196,1	6 681,0
<b>Average of Hungary</b>	<b>Mo.</b>	<b>501,2</b>	<b>336,3</b>	<b>131,3</b>	<b>26 556,5</b>	<b>22 988,4</b>	<b>3 037,0</b>

Source: KSH, constructed by Sitányi L.

Based on the available documents, personal experiences and the dominant participants' opinion in the South Transdanubian Regional Innovation Network the following questions have been formed in the *second third* of the survey:

- What kind of development level and potentials does the regional innovation network have?
- Which subregional innovation methods and applied means have succeeded?

<sup>10</sup> In this relation the data of Central-Hungary (CH) –which is much more than the other regions because Budapest has got much R+D innovation – can be seen in Table 1. but they cannot be compared to the other six Hungarian regions.

<sup>11</sup> In terms of the “number of researchers and developers per 100 thousand persons” – with a “4 per person” difference – South Transdanubia comes second behind the South-Great-Plains.

- There are several deficiencies revealed during the research in the region and at the University of Pécs. Which ones can be changed?

In the *third part* of the regional survey based on a locally arranged research we carried out together with two other teams, we aimed at revealing the factors which are considered to be the most obstructive in the opinion of the innovative companies, the organizations working on enterprise and innovation developments in South Transdanubia and what sort of measures are planned to be taken in order to solve these problems in the near future.

### ***Goals of research carried out at the University of Pécs***

The *evolutionist tendency of the so called 'Triple Helix' conception* is founded on the fifth-generation innovation model which is based on the 'bottom-up' formation principle among the personal initiatives of those concerned and within this on the trial cooperation of *University-government-company*. This tendency is based on mutually interrelated relationships.

Many people share the opinion that *Universities have got the most important and complicated task* out of the three components. Universities are slowly-adaptable and not flexible enough in terms of role and management approach, so they *need to carry out basic modifications, new theoretical approaches if they want to keep and fulfil their task in the region*.

We have tried to answer the question with the help of our empiric survey at the University of Pécs (PTE) whether the higher educational institutions have got measurable economy-encouraging influence in the region and if they possess the necessary power to retain their intellectuals. For obtaining a satisfactory response we have surveyed the conditions which seem to be obstructive in the eye of population at the University. We have made inquiries about what teachers and students think and know about this issue, what is their attitude towards each other, what is their opinion about the micro- and macrosphere surrounding them and about the University of Pécs itself. We are interested in how much they are aware of the destination of the research incomes at the University of Pécs and if they agree on the purposes they are used for.

We wanted to find out what our teachers and students generally think of entrepreneurs, and especially of those innovative companies which originate from the higher education sector and the participating colleagues and teachers who are involved.

A question of great importance has emerged: to what extent does the university population know about the financial and professional organizations intending to assist in the above mentioned processes and how do they regard them?

The results of our own survey – examining the innovation position from the point of view of local people participating in the higher education at the University of Pécs – can be compared to certain statements in the national and regional surveys.

### **3. RESEARCH METHODS**

The thesis is based on a wide range of national and international bibliography. Each chapter of the dissertation includes widespread specialized literature. The Hungarian Central Statistical Office (KSH) data in Hungary are primarily the starting points for the view of regional processes. The results and the experiences in the survey made by people in the South Transdanubian innovation network have been in the focus of the empiric research. It has been supplemented by a secondary analysis of three innovation surveys. One of them is an annually organised European survey and the other one is a regional South Transdanubian of 2009/10. EU data collections and regional statistics focusing on innovation simply do not exist, which has made the comparison of the international surveys difficult. Furthermore, they entirely and continuously do not follow the formation of the innovation performance at a regional level<sup>12</sup>.

#### ***The methodology of the secondary analysis aiming at the determination of Hungary's innovation position***

We have made an attempt in this secondary analysis to draw the relative innovation path of six neighbouring countries (*charts 2-5*) after looking through the European Innovation Scoreboard<sup>13</sup> (EIS) which was established in the European Union under the Lisbon Strategy, taking into consideration its main modifications (*chart 1.*), so we can present our position in the '*relative innovation practice*'. Hungary and the other five analyzed countries have been chosen in order to give an example for comparison and presentation. There is a defined and *simple calculating method* of my own – introduced in details – which is *suitable for presentation of comparing the position of any other European country-groups*.

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<sup>12</sup> Unfortunately the regional depth of the data did not allow a more detailed analysis at the regional level. A regional innovation scoreboard was published about the 15 EU member states at the time in 2002 and 2003. In 2006 a new scoreboard was made including 25 member states and 208 regions, but due to incomplete data in new member states they had to face serious methodological difficulties.

<sup>13</sup> In some cases, mainly in the case of innovation data and indicators, we have used other European organizations' collections and suggestions. *They were the following EU institutions:* European Innovation Scoreboard; European Commission, Enterprise Directorate-General, Innovation Directorate, Communication and Awareness Unit; Maastricht Economic Research Institute on Innovation and Technology (UNU-MERIT); Joint Research Centre (JRC), Unit of Econometrics and Statistical Support to Antifraud (ESAF) of the Institute for the Protection and Security of the Citizen (IPSC); University of Karlsruhe and Fraunhofer Institute for Systems and Innovation Research.



### *The methodology of primary and secondary data collection in the general survey at a regional level*

We have found it important to involve in our survey the essential information for our study from the South Transdanubian Regional Innovation Network and the interviews and discussions built on personal experiences and acquaintance. Information collection from having interviews seemed to be suitable because they made it possible to get exact data about the habit of the dominant participants dealing with the network innovation in this way. The interviews let us know about people's ideas, their attitudes towards development and towards the local community and in the region. The information gained through the interviews also have been analyzed based on so called 'soft factors'. Thus in the case of these interviews we could take into consideration all the views which describe the structure and the operation of the local society, community and the social capital, furthermore which determine the participants' habits and their motivation. We did not only rely on our own experiences in the case study but we have comprised all those further surveys in the field, therefore some parts of the statements are given by their results.

The above mentioned regional survey<sup>14</sup> was the last in the row in South Transdanubia, in which 15 percent of the innovative economic participants' circle has been assessed. *This amount definitely enables to draw conclusions about the entire majority from.*

The other completed South Transdanubian survey in this field titled '*The position of the starting enterprises in the South Transdanubian region and the position of the incubation services*' has been carried out by applying qualitative methods. Twenty-two leaders (88%) of 25 industrial parks of South Transdanubia have been questioned personally in manager interviews using structured questionnaires, so this survey<sup>15</sup> also can be regarded as representative.

We wanted to supplement the above detailed results of the survey, so we created a new questionnaire in summer 2010. The regional managers of DDRIÜ-network were asked to share their opinion about the local innovation position. We suppose that the summary of the replies based on in time and space and in practice and theory varied experiences is a perfect addition to the conclusions drawn from the primary and secondary data collected with different methods in different spheres.

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<sup>14</sup> This applied survey by the DDRIÜ Nonprofit Kft. by the leadership of Zoltán Csizmadia and András Grosz (MTA RKK NyuTI) took place in South Transdanubia in summer 2009. The title of the survey: *Innovation questionnaire survey of companies in the South-Transdanubian region.*

<sup>15</sup> LUDESCHER G. – PAP N. 2010: *Az induló vállalkozások helyzete a Dél-Dunántúli Régióban, az inkubációs szolgáltatások helyzete.* Kézirat, DDRIÜ Nonprofit Kft. 40 p.

### *The methodology of the own survey carried out at the University of Pécs*

Our empiric research<sup>16</sup> was carried out at the University of Pécs in June 2009. The methodology was based on questionnaires and it aimed at collecting the University teachers and school leavers' opinions. The survey has focused on the relationship between students and teachers, the analysis of the network between the academic institution system and the real sphere, the connection with the characters of economy and innovation-supporting system and the attitude towards the financial service sector.

*The sampling itself cannot be considered representative however we have been given specific useful information which seems to be suitable to draw conclusions from.* The rate of those taking part in the survey with filling in the questionnaire-forms is similar to the opinion of the entire population questioned, so we can formulate relations about the people's viewpoint who participate in the University's everyday life and probably who will be dominant figures in the formation of the regional innovation at present and in the future (table 2.).

**Table 2.: Division of the whole surveyed population based on gender and University faculties**

<b>Based on genders</b>			
	<b>University students persons (%)</b>	<b>University lecturers persons (%)</b>	<b>Total persons(%)</b>
Female	127 (47,6)	11 (26,8)	138 (44,8)
Male	140 (52,4)	29 (70,7)	169 (54,9)
No reply	0 (0,0)	1 (2,4)	1 (0,3)
Altogether	267 (100)	41 (100)	308 (100)

<b>Based on University faculties</b>			
	<b>University students, persons (%)</b>	<b>University lecturers, persons (%)</b>	<b>Total persons (%)</b>
Faculty of Medicine (ÁOK)	29 (10,9)	9 (22,0)	38 (12,3)
Faculty of Humanities (BTK)	37 (13,9)	6 (14,6)	43 (14,0)
Faculty of Adult Education and Human Resources Development (FEEFK)	2 (0,7)	0 (0)	2 (0,6)
Faculty of Business and Economy (KTK)	124 (46,4)	10 (24,4)	134 (43,5)
Faculty of Natural Sciences (TTK)	56 (21,0)	12 (29,3)	68 (22,1)
Pollack Mihály Faculty of Engineering (PMMK)	18 (6,7)	4 (9,8)	22 (7,1)
No reply	1 (0,4)	0 (0)	1 (0,3)
<b>Total</b>	<b>267 (100)</b>	<b>41 (100)</b>	<b>308 (100)</b>

*Source:* based on the data of own survey **constructed** by Sitányi L. (2009)

<sup>16</sup> The arrangements, organizing activities and the plan of the survey were co-research with Gabriella Ludescher sociologist and with the support of DDRIÜ Nonprofit ltd. and PTE TTK FI. The conclusions and the charts in the thesis are based on the research data of Sociograph Market and public Opinion Poll Institution and on the analysis of the questions connected to the author's research field.

## 4. RESULTS AND CONCLUSIONS

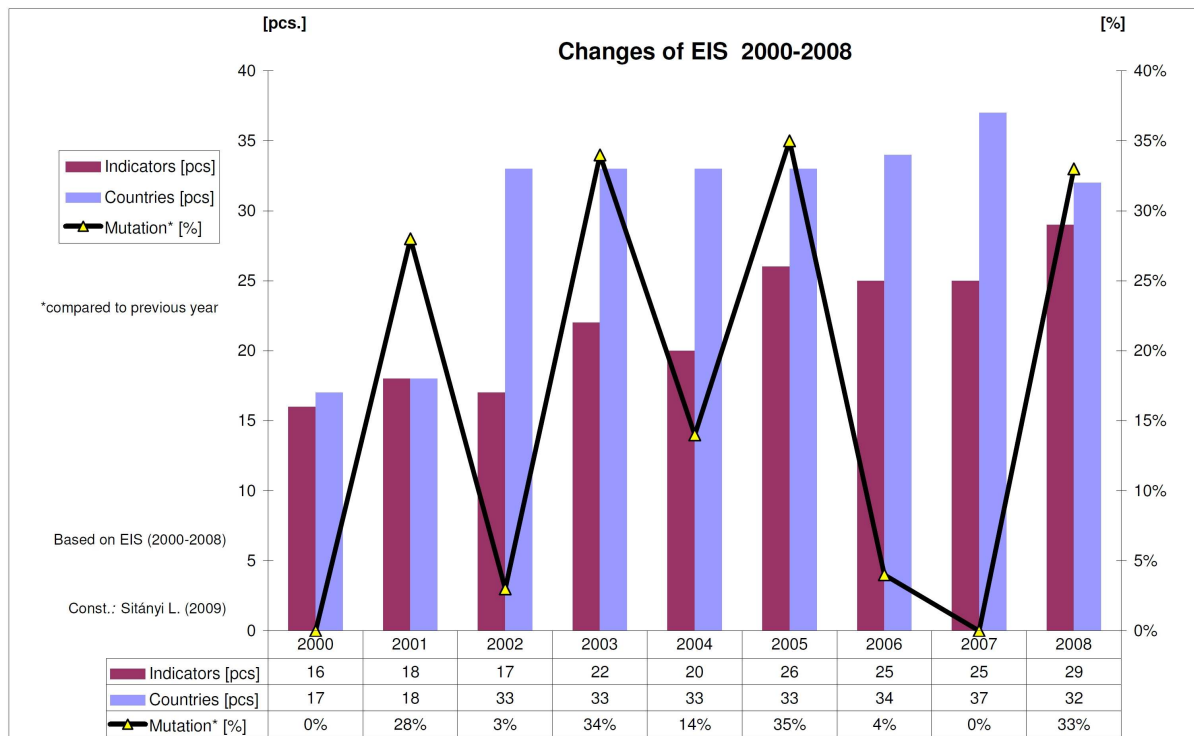
### 4.1. Results of the research

#### *Innovation position of Hungary compared to European countries*

We have made an attempt to define the innovation position of Hungary among European countries in the study case of the 4<sup>th</sup> chapter of this thesis within the range the dissertation allows. All the statements are strictly based on available facts and statistic data. The constructed database of the European Innovation Scoreboard (EIS) which has been constantly improving in methods since 2000 and its report – in which Hungary has been included since 2002 – give alternatives<sup>17</sup> to follow and survey the processes going on in this field throughout Europe.

The system has been developed from year to year by the researchers who involved new aspects, innovation indicators in the calculations (*chart 1.*) In order to reduce the number of distortion caused by modifications and in order to be able to compare our progress to other European countries, the concepts of relative SII and CTI have been introduced.

**Chart 1.:** *The EIS indicators and the number of countries (by the piece), differences (%) compared to the previous year, 2000--2008*



*Source:* Based on EIS (2000-2008) *constructed by* Sitányi L.

<sup>17</sup> As it was said above unfortunately the territorial depth of innovation data available for us did not allow us to make a greater and more detailed regional analysis.

## The calculation method of relative SII and CTI and their values

Development experts and analysers of the European Innovation Scoreboard (EIS) database have created the Summary Innovation Index (SII) out of the annual index numbers and they could calculate the innovation performance level of each member state.

According to our calculation the relative SII value of the “i” country given in percentage in a given year can be calculated with the following simple formula<sup>18</sup>:

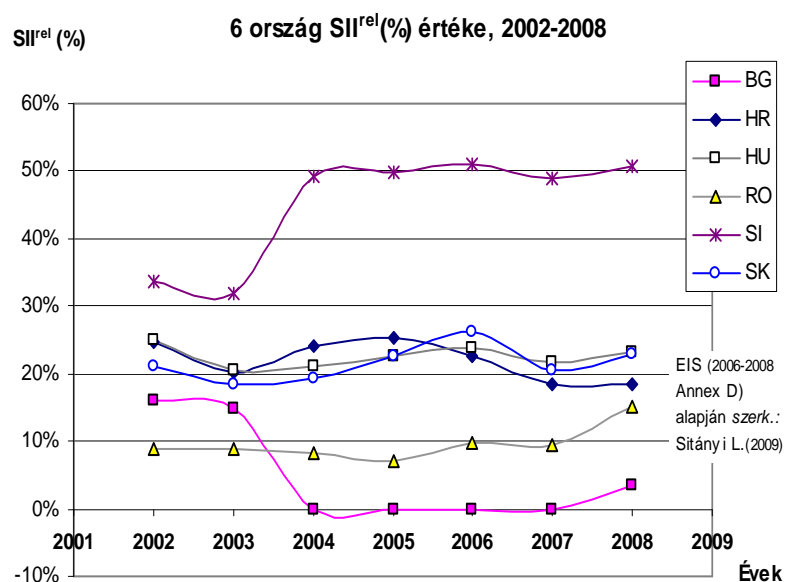
$$SII_i^{rel} [\%] = \frac{SII_i - SII_{min}}{SII_{max} - SII_{min}} * 100$$

**Table 3.:** The relative innovation index ( $SII^{rel}$ ) of the six selected countries between 2002 and 2008

Domain =>		0,665	0,724	0,440	0,441	0,459	0,456	0,477
$SII^{rel}$		2002	2003	2004	2005	2006	2007	2008
Bulgaria	BG	15,96%	14,94%	0,00%	0,00%	0,00%	0,00%	3,44%
Croatia	HR	24,79%	20,30%	24,15%	25,40%	22,52%	18,27%	18,55%
Hungary	HU	25,02%	20,48%	21,25%	22,46%	23,78%	21,81%	23,32%
Romania	RO	8,73%	8,76%	8,32%	7,00%	9,65%	9,43%	15,18%
Slovenia	SI	33,80%	31,80%	49,08%	49,73%	51,00%	48,96%	50,60%
Slovakia	SK	20,99%	18,46%	19,35%	22,48%	26,17%	20,54%	22,86%

*Source:* Own calculation based on appendix “D” of EIS 2006, 2007, 2008

**Chart 2.:** The relative innovation index ( $SII^{rel}$ ) of the six selected countries between 2002 and 2008

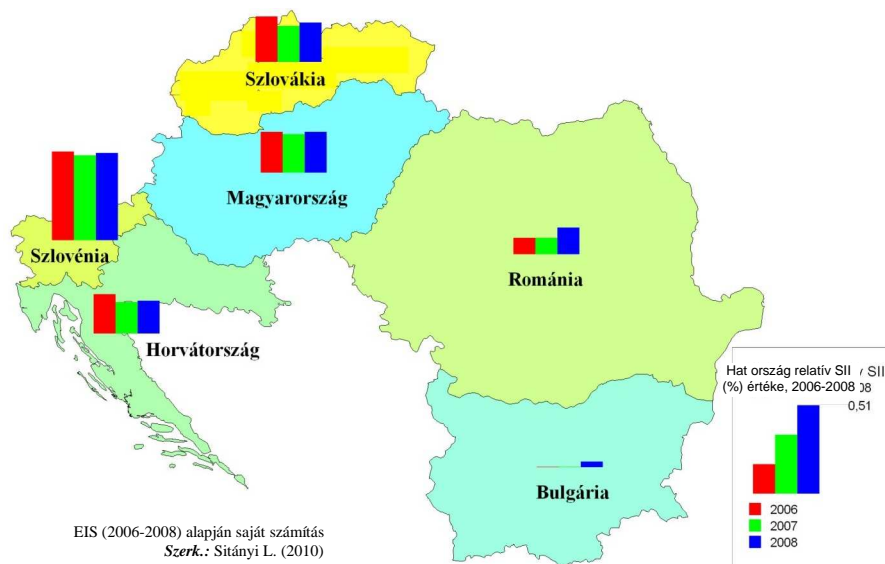


*Source:* based on the data of table 3. **constructed by** Sitányi L. (2009)

<sup>18</sup>  $SII_{min}$  means the lowest value in the given year,  $SII_{max}$  means the highest and  $SII_i$  the SII value of the examined country.

As the first result of the thesis – based on the data of six years between 2003 and 2008 and deriving from it the national summary relative innovation index ( $SII^{rel}$ , table 3.) – it can be established that *the statement*<sup>19</sup> – which could be heard repeatedly in the media and in developmental expert policy – as per *Hungarian innovation performance has considerably approached European countries (charts 2. and 3.) is false.*

**Chart 3.:** The relative innovation index ( $SII^{rel}$ ) of the six selected countries between 2006 and 2008



**Source:** based on the data of table 3 **constructed by** Sitányi L. (2010)

Furthermore, data have also shown that *this approach in the domain of innovation did not come true* in comparison with neither the European leading countries nor the *countries we are in the same geographical region* with (South eastern Europe) based on the EU geographical classification and the similar social-economical position of them. While in terms of SII we could not approach Slovenia<sup>20</sup>, which stands high above the countries, Bulgaria and Romania were able to whittle their considerable handicap. Slovakia has continuously worked off its minor backlog compared to Hungary and since 2006 it has overtaken us in several aspects. (*charts 2. and 3.*)

Research institutions responsible for constructing EIS also strove to establish the determining directions of the member states' innovation performance. The *average Change Trend Indicators in Innovation (CTI)* is a calculation destined for predicting expected development in

<sup>19</sup> “Hungary has set out on the path of convergence in the past few years” could be read in the 2009-2010 Hungarian Research Development and Innovation Action Programme.

<sup>20</sup> The socialist past of the two Yugoslavian successor states Croatia – whose economy suffered more negative effects by the Yugoslav Wars – and Slovenia set the course of a completely different economical way, which was different from the other four countries involved in our research. Obviously these four countries also differ from each other.

the future. The “relative calculation” method – suggested by the Author – can be applied for this calculated indicator, just like previously for SII. The relative CTI value of the “*i*” country given in percentage in a given year can be calculated with the following formula<sup>21</sup>:

$$CTI_i^{rel}[\%] = \frac{CTI_i - CTI_{min}}{CTI_{max} - CTI_{min}} * 100$$

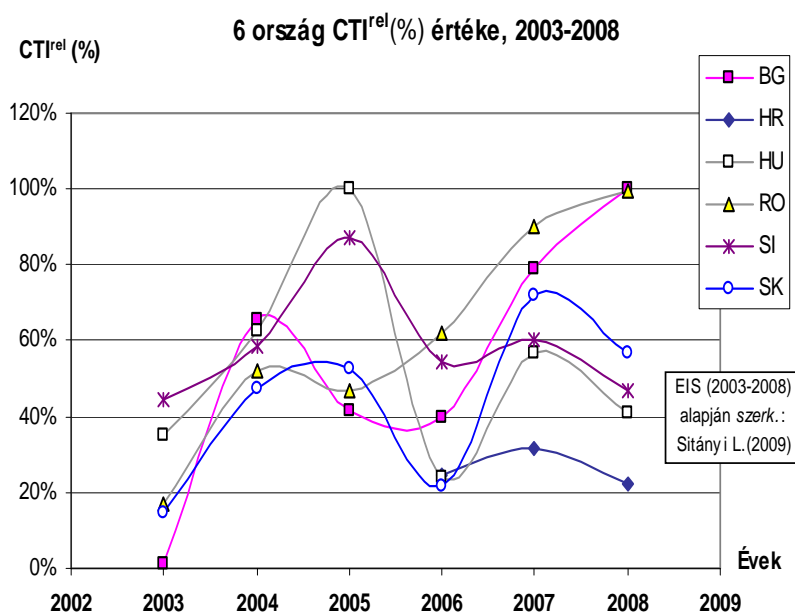
By connecting the points showing the position of a given country in a given year we will get the graph (chart 4.), which shows the relative change of innovation trend indicators (*CTIrel*) of the examined country. The graph has much bigger surges than SII courses.

**Table 4.:** The relative change of the innovation trend indicators ( $CTI^{rel}$ ) in six countries between 2003 and 2008

Domain =>		0,318	0,221	8,631	3,064	8,235	0,070
$CTI^{rel}$		2003	2004	2005	2006	2007	2008
Bulgaria	BG	1,26%	65,61%	41,73%	39,57%	78,84%	100,00%
Croatia	HR	-	-	-	24,50%	31,41%	21,97%
Hungary	HU	35,22%	62,44%	100,00%	23,83%	57,06%	40,86%
Romania	RO	16,98%	52,04%	47,10%	62,08%	90,24%	99,54%
Slovenia	SI	44,65%	58,82%	87,45%	54,59%	60,28%	46,97%
Slovakia	SK	14,78%	47,51%	52,73%	21,44%	71,92%	56,50%

Source: Own calculation based on EIS 2003 – 2008

**Chart 4.:** The relative change of the innovation trend indicators ( $CTI^{rel}$ ) in six countries between 2003 and 2008

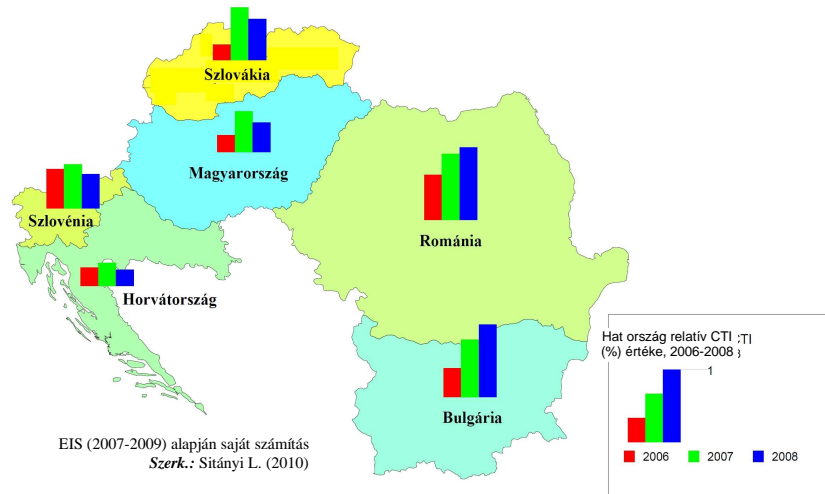


Source: based on the data of table 4. constructed by Sitányi L. (2009)

<sup>21</sup>  $CTI_{min}$  means the lowest value in the given year,  $CTI_{max}$  the highest and  $CTI_i$  is the CTI value of the examined country.

The six examined countries'  $CTI^{rel}$  value between 2006 and 2008 is demonstrated on the following map (chart 5.). We can see that during the last three analyzed years<sup>22</sup> both Romania and Bulgaria increased, while Slovenia, Slovakia and Hungary showed unsteady values just like Croatia. However, it reached only half of the  $CTI^{rel}$  level of the three countries in the past two analysed years. (charts 4. and 5.).

**Chart 5.:** The relative change of the innovation trend indicators ( $CTI^{rel}$ ) in six countries between 2006 and 2008

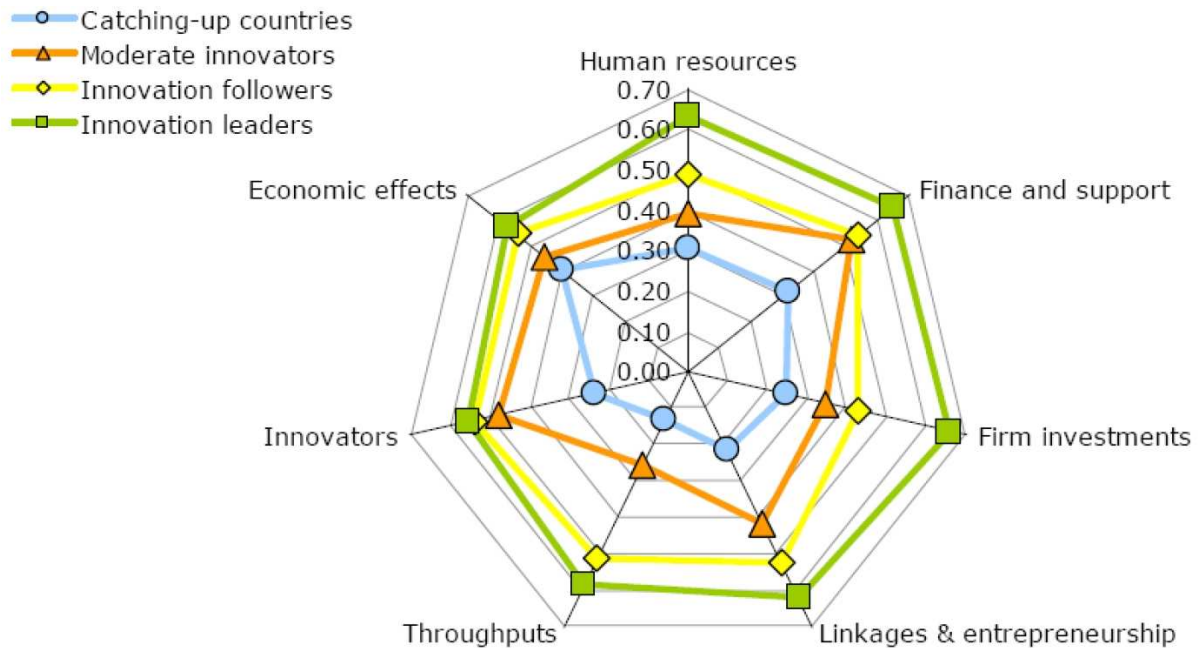


*Source:* based on the data of table 7. **constructed by** Sitányi L. (2010)

The detailed, annual analysis of the EIS reports and their background materials has produced two more additional results beyond the original aim. One of them was setting the direction of innovation development based on EIS secondary analysis. We deem it a significant recognition from the aspects of both area development and general development policy. The EIS reports of recent years (EIS 2005, 2007, 2008) also established the negative correlation between innovative performance and the variance of certain characteristics.

<sup>22</sup> Croatia's innovation trend indicator (CTI) data were available only for these years.(table 4.).

**Chart 6.:** Innovative performance of the groups of countries based on the seven major dimensions in 2008



*Source:* European Innovation Scoreboard (2008, p. 11.)

The leading countries' data were uniformly high; bigger difference between the various innovation indexes was characteristic of less developed countries. (*chart 6.*)

Conclusion presents itself for each regional level *as per individual "dimensions" need to be developed parallelly, high innovation performance cannot be achieved in the long run when certain regions are developed concentratedly while others are neglected.*

The other conclusion is that EIS researchers – beyond the usual analyses – have also surveyed the impact of social, economic and regulatory environment in 2007. It revealed that two out of the surveyed seven categories were in close connection with the summary innovation performance: *social capital and technology flow*. It was also established that the indicators in the two categories show strong correlation with the level of *firms' innovation performance*. Based on the above result development policies should rest on growing confidence level, fighting corruption, and developing industry-university research cooperation. These goals can be achieved by the strengthening of publicity and transparency, as well as by supporting innovation networks and innovation cooperations. Another EIS secondary analysis, carried out in 2007 also supported the above-mentioned. It revealed that *summary innovation index had the closest connections with the following characteristics:*

- Corruption control;
- Government efficiency;
- Legal regulation.



## ***Innovation and development possibilities in South Transdanubia***

According to the managers of innovation firms three out of the four factors hindering innovation to the greatest extent were finance and market related. They were expected to respond to the strongly hindering financial factors with their plans. Neither our primary nor our secondary research found the signs of such plans when questions were asked in connection with service utilization. Thus it is a surprising fact – however, it is in accordance with the results of our own research at the University of Pécs – that *the utilization of financial services is on a small scale and it shows decreasing intention in the future.* (table 5.).

**Table 5.:** *Utilization and change in financial services (past – future)*

<b>Financial services (Yes)</b>	<b>Past [%]</b>	<b>Change [%]</b>	<b>Future [%]</b>
Access to guarantee funds	6,6	<b>4,3</b>	10,9
Factoring	9,0	<b>1,9</b>	10,9
Involving Angel Investors	0,0	<b>1,1</b>	1,1
Business credit on preferential term	30,4	<b>-3,6</b>	26,8
Involving venture capital	9,1	<b>-4,6</b>	4,5
Leasing possibility	30,8	<b>-6,0</b>	24,8

*Source:* CSIZMADIA Z. – GROSZ A. (2009) *constructed by* Sitányi L.

Our primary and secondary experiences have also proved that the managers of innovation firms do not lay considerable claim to the other services of organizations *directly supporting innovation*<sup>23</sup> in South Transdanubia. (table 6.) It was also confirmed by our own, complementary regional research as well as the representative research on South Transdanubian industrial parks and incubator houses carried out by somebody else and already mentioned on page 7.

**Table 6.:** *Claim to innovation organisations' services (past — present)*

	<b>Types of Organizations</b>	<b>Abbr.</b>	<b>In the past</b>	<b>In the future</b>	<b>Change</b>
<b>1.</b> group	Chambers of Commerce and Industry	MKIK	29,3%	36,4%	7,1%
	South Transdanubian Regional Development Agency	DDRFÜ	12,1%	32,2%	20,2%
	South Transdanubian Regional Innovation Agency	DDRIÜ	4,7%	25,8%	21,1%
<b>2.</b> group	Business Enterprise Centres	MVK	16,1%	22,1%	6,0%
	Consultancy firm	Tanácsadó	16,7%	18,7%	2,0%
<b>3.</b> group	University Transfer Offices	ETI	6,4%	7,7%	1,3%
	Industrial park or incubator house	Ip. Park	3,0%	6,6%	3,6%
	Cluster organization	Klaszter	3,0%	4,2%	1,2%

*Source:* CSIZMADIA Z. – GROSZ A. (2009) *constructed by* Sitányi L.

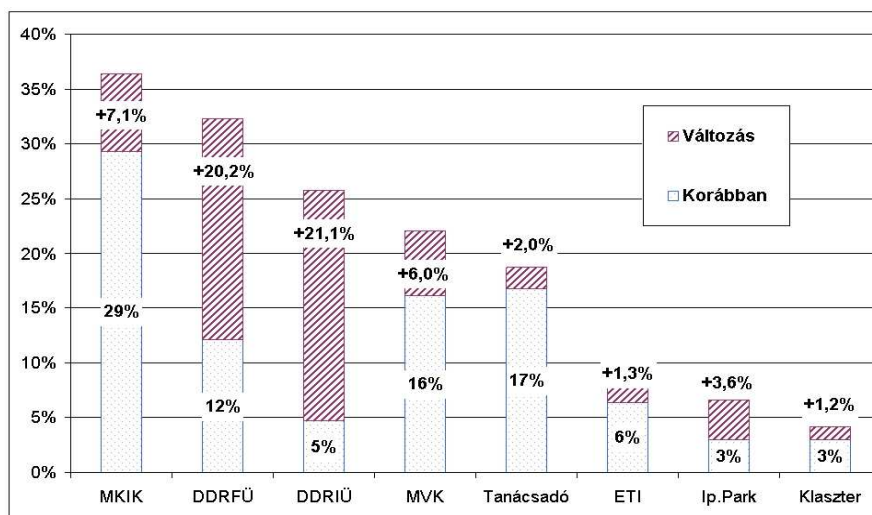
<sup>23</sup> Cluster organizations, industrial parks and incubator houses, University knowledge transfers (Past and future: below 8%).

Naturally, we have also examined the flip side of the issue, the side, which enforced the above and found that it lacked operative programs longer than three years, as well as operative financing, which would provide constant, stable conditions for the intermediary organizations.

All in all, the reasons for the above phenomena are partly beyond their control, but in total we can say that *losing the original target group of the organizations supporting innovation directly to such extent implies that the local innovation system is going the wrong way.*

Out of the few promising local research results one of the most important is the dynamically improving DDRIÜ Nonprofit Ltd's position – it is in charge of the South Transdanubian innovation network – in respect of claim to intermediary organizations' services. The research was carried out among the innovation enterprises in the region. (*chart 7.*)

**Chart 7.:** *Claim to the services of innovation organizations and how it changed (past – future)*



*Source:* CSIZMADIA Z. – GROSZ A. (2009) *constructed by* Sitányi L.

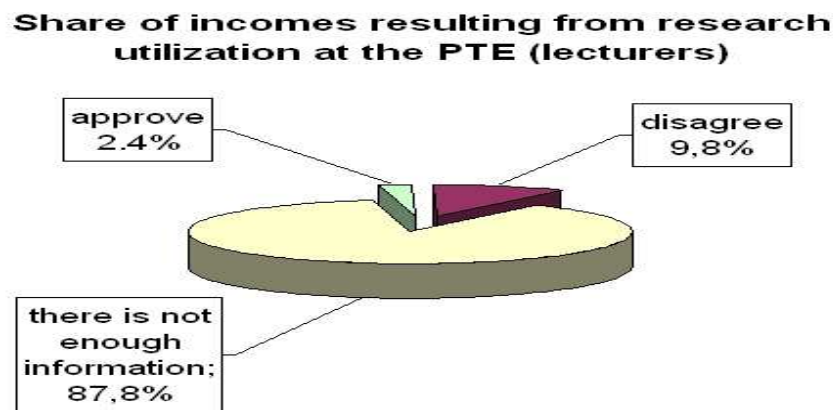
Indisputably, it is a serious recognition of the work DDRIÜ Nonprofit Ltd. has done recently from the private sector's side. However, it reveals an extremely fragile regional environment, where a firm, which is small in number (7 persons), with uncertain financial future – financed until June 2011 – is deemed to be the most significant and almost the only regional player, which is suitable to maintain innovation network operation and to induce development according to local research experiences.

### ***Innovation Environment at the University of Pécs***

We have surveyed and taken the following statements of the technical literature on the subject as a good starting point: trust is needed to build well-functioning networks, while networks are essential to develop innovation environment, and finally that transparency is one of the fundamentals and one of the most significant strengthening factors of trust.

Based on these it has to be admitted that *presently the innovation environment is not favourable to have a successful development with such background at the University of Pécs*. The majority of University lecturers (87.8%) stated that they did not have any information on the share of incomes resulting from research utilization at the University of Pécs (*chart 8*).

**Chart 8.:** *Share of incomes resulting from research utilization at the PTE (lecturers)*

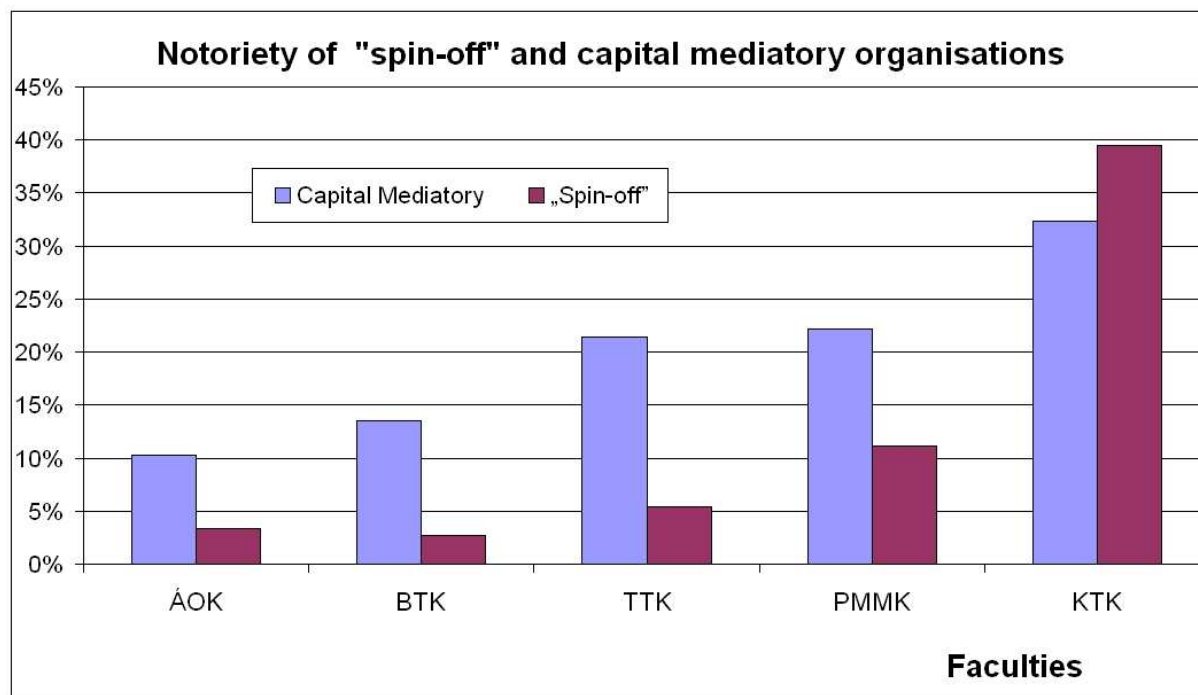


Source: based on the data of own survey **constructed by** Sitányi L.

Out of the respondents who thought to have enough information (12.2%) four-fifth (9.8%) disagreed and *only a fraction (2.4%) of lecturers approved of the way how “the share of incomes resulting from research utilization at the University”* was distributed.

It is generally believed that we are suspicious of the unknown. If we accept this it is not encouraging that only a quarter (24%) of graduate students has *heard about capital mediatory, financial provider organizations specialised in innovation development*, and even fewer know about “*spin-off*” type enterprises (21.3%). The level of knowledge was very different in both questions among faculties. The result of all faculties without the Faculty of Business and Economy (KTK) *the mean of notoriety of spin-off definition does not even hit 5% among students. (chart 9.)*

**Chart 9.:** Notoriety of “spin-off” and capital mediatory organizations



*Source:* based on the data of own survey **constructed by** Sitányi L.

There was no confidence towards the other significant innovation developing factor, the institutional and decision-making system of financial subsidies. The two target groups shared their opinion in the justification of supports for new ideas, according to which signs of *corruption* and *unpredictability characterise this system*. This phenomenon obviously hinders the absorption of innovation support sources, since those who think like that and who have not got the proper connections will not even lodge their tenders<sup>24</sup>.

Neither lecturers nor students turned to institutions specialised in either financial or professional assistance. Neither of the groups trusts (in this decreasing ranking order) in institutions specialized in innovation development, entrepreneurs, banks and finance providers.

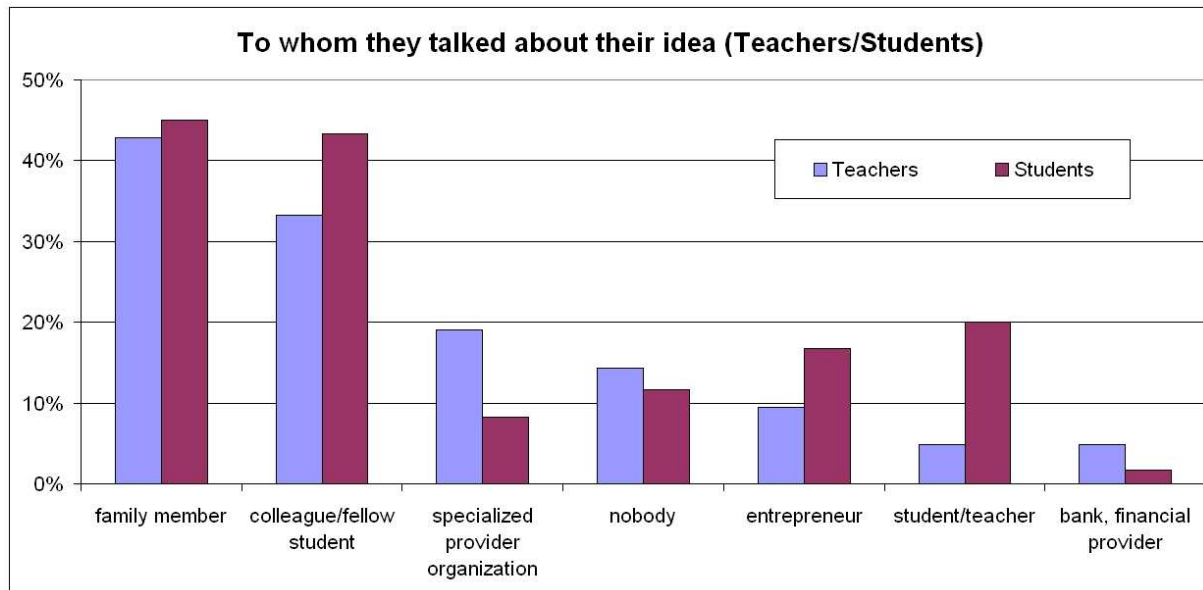
Trust problem from teachers’ aspect exists between the two target groups. Respondent lecturers placed their students to the end of the ranking when they were asked “*to whom they talked about their idea?*”

From this we have drawn the conclusion that students in Pécs are hardly expected to be involved in merit in their teachers’ research, or to be informed about their research results.

<sup>24</sup> This statement is supported by the DDRIÜ Nonprofit Ltd.’s experience as per the utilization proportion of one of the sources, namely the „Baross Gábor” innovation program continuously decreased in South Transdanubia between 2005 and 2008. Therefore the region “lost” a central subsidy worth 1,3 billion HUF.

They have even less chance of an offer for cooperation – assuming strong confidence – where they would co-establish a company<sup>25</sup> with their teachers. (*chart 10.*)

**Chart 10.:** *To whom they talked about their idea (Lecturers/Students)*



*Source:* based on the data of own survey **constructed by** Sitányi L.

### ***Factors hindering innovation based on the local representatives of different sectors***

Factors hindering innovation have been examined in all three spheres<sup>26</sup> of the “Triple Helix” model. Each group deemed financial obstacles as the biggest in the progress of innovative development. However, we could also see distrust, and many times lack of knowledge in connection with service providers, services, and financial opportunities supporting innovative enterprises. Our research at the University of Pécs also established that neither students nor the majority of teachers – qualified for giving information to students – have sufficient knowledge about these. Although we accepted the point that the participants of the academy sector are not necessarily expected to have deeper knowledge on the issue, but still we reckon that the necessary minimum level of knowledge for a satisfactory innovative University background can be relatively quickly acquired (in this well-trained circle) with proper and targeted training.

However, the similar analytical result – carried out among innovative firms and managers dealing with practical financial matters on a daily basis for organizations specializing in professional innovation development – was way too unexpected. Conclusion presented itself:

<sup>25</sup> We think that a joint student-teacher enterprise is the most efficient form of University spin-off.

<sup>26</sup> According to this repeatedly quoted model real innovation cannot be realized without the active participation, cooperation of *state* (and the innovation intermediary organizations financed by it), *Universities, research institutions, and enterprises.*

if it is a general phenomenon, which can be experienced among the managers in all three high priority sectors, presumably there could be problems on the other “source” side of finances, namely among banks, capital owners, finance providers.

Unfortunately it was not included among our onset assumptions; therefore we cannot answer this question in the present research.

#### **4.2. Possibilities to utilize the results of the thesis**

We could see that conviction has continuously grown in the technical literature of the past three decades according to which economic results are interdependent with the level of social capital in the local society. This scope was examined in 2007 by EU researchers, who revealed that two out of the seven dimensions of social, economic, and regulatory environment were determinant, and one of the two was the *degree of social capital*.

It was also explored that the indicators of the factors comprising this category showed strong correlation with *corruption control, government efficiency, and legal regulation*.

The above facts have supported our previous, theory-based assumptions with practical research results. According to these assumptions development policy is able to improve local innovation environment with targeted changes on fields, which require relatively low financial investment. These are supposed to have an effect on

- growing confidence level,
- fighting corruption, and
- developing industry-University research cooperation.

All these can be achieved by the *strengthening of publicity and transparency, as well as by supporting innovation networks and cooperations*.

Based on the research *it is necessary to develop human resources* especially in the comparison of national levels – examined in chapter four – and most likely in the regional dimension too, which comes from the other. The presence of one of the biggest Universities is a good ground base in South Transdanubia, however, the University itself is not enough for development, which was proved in our case study examining the innovation environment at the University of Pécs.

We deem that the *financial controversy explored in the case of participants* in all three basic pillars of innovation environment – especially if we consider its hindering role in innovation and the development of local economy – can be regarded as a *comprehensive result experienced at each local level* (incubator house, settlement, subregion, county, region).

We also think that their deeper connections should be explored as soon as possible so that we can get an idea about the reasons why the utilization of financial services is so low, why it shows decreasing willingness, and why the regional presence of such services is hardly perceptible. After finding the reasons they have to be repaired as soon as possible, because acute shortage of cash may deeply hinder innovativity of economy in South Transdanubia and also its sustainable development in the long run.

Since financial knowledge, the notoriety and acceptance of intermediary organizations are clearly at a very low level in the region, we think that the first step can already be seen in order to obtain the necessary sources for innovative development: various methods on how to “attract active capital” need to be taught. The present attitude might begin to change with such training by education, by propagating general knowledge<sup>27</sup>, and by presenting mechanisms, which are in charge of the operation of capital intermediary, finances, and other market and institutional participants.

Based on the facts experienced during the research we think that every organization mediating local innovation should redeem the functions they would like to fulfil. It is especially true for *organizations supporting innovation directly* (industrial parks and incubator houses, cluster organizations). Their services and activities should be redirected to the place where they could be once more important partners for their original target group, the South Transdanubian innovative enterprises. With the help of their establishments, accumulated and significant knowledge, local experiences and relations they could profitably help the development of both the region and their micro environment to encourage or support entrepreneurs for innovative development.

Every single secondary and primary local research has run into problems caused by the lack of constant operative financing when examined the participants of the Hungarian innovation system. This problem is not a new result to the research. However, due to the general and considerable extent of its existence we found it necessary to call attention to it because of the damages it has done, and also because of the necessity to remedy it.

We could see its theoretical importance in establishing technical literature, and at the University of Pécs we could experience in practice the lack of attitude necessary for trust and development. Since they require not only the acquisition of practical knowledge but also the change of attitude and mentality – which are long processes – *formation of attitude should*

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<sup>27</sup> This activity has already begun within the TÁMOP project, which supports innovation at the University of Pécs.

*begin among students entering higher education* the latest. Education of the new University researcher/lecturer generation should be also helped this way, since these graduate students and young employees might have Shumpeter's entrepreneurship, the willingness to take risks, and they may understand the "language" and claims of economic participants, therefore they will be able to "carry" innovation.

The present state of South Transdanubian innovation environment is greatly helped by the already demonstrated domestic and EU subsidies, the centrally supported University developments. However, it can already be seen that the majority of them are most likely non-recurring opportunities. As a consequence a considerable part of their future financial results will have to be reinvested into the early stages of innovation process for the long-term sustainability of financing proper research environment.

Among the specifications in this point the institutions of the DDRIÜ network and the local participants of the academy sector have important roles as individual institutions. If a high-level cooperation could be realized between them, and the synergic effect of their activities could be strengthened, it would be a determining positive factor in the region's development.

#### **4.3. Further research directions**

##### ***International comparisons in the European innovation sphere***

In the coming years we would like to continue analysing the European innovation situation in further details, to focus on the regional level, and with the help of this clear picture we would like to analyze processes and phenomena which were also considered in this thesis in accordance with others' work. Also we would like to carry out further case studies in the Eastern-Central-European countries, as well as in the field of the effects of European and national level innovation policies supporting financing<sup>28</sup>.

##### ***Revealing the reasons of regional experiences and their effect on innovation***

Based on the European research such a regional indicator system could be developed, which would be able to follow up on the changes of the Hungarian regional innovation environment.

Based on the research at the University of Pécs we deemed that neither students nor the majority of teachers – qualified for giving information to students – trust and/or have the

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<sup>28</sup> *Major questions to be answered:* How should central regulation, legal environment, securities, assessment and the aspects of project choosing change so that the national and EU source-based developments remained efficient and sustainable as a result of synergic changes? Is it provable that the absorption of development supports and its efficiency shows strong correlation with the trust an individual country's citizens put in their own institutions?



proper knowledge about financial opportunities, services and service providers supporting (innovative) enterprises. When the same statement (*table 5.*) was true for the managers of innovative firms, the conclusion presented itself: *There might be problems on the “other side”, namely with the Hungarian services of banks, capital owners, and financial intermediaries.* Since it was not a part of either research objectives, we could not give precise answers to these questions. However, based on the above experiences we think that the controversy revealed here is worth further analyses among each target group.

### ***Innovation environment***

From many aspects it would be useful to compare Pécs with Debrecen and Szeged, and also to compare Pécs with the Universities together with their cities and characteristics. One of the aspects of the research could be the similar attitude analysis in the two other cities, which was carried out among the lecturers and students at the University of Pécs. With such a comparison we could get even more appreciable results.



## PUBLICATIONS ON WHICH THE PHD THESIS WAS BASED

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#### **LECTURES ON WHICH THE PHD THESIS WAS BASED**

*Az egyetem, az innováció és a társadalmi tőke kapcsolatáról a Pécsi Tudományegyetem példája és a dél-dunántúli vállalkozások véleménye alapján* (2010) „VÁLLALKOZÓI INNOVÁCIÓ A DUNÁNTÚLON” szakmai konferencia, DDRIÜ Nonprofit Kft. Pécs, 2010. március 3.

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