UNIVERSITIES AND THE ICT INDUSTRY IN SEARCH FOR INNOVATIVENESS

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1 GENERAL CHALLENGES

Collaboration between universities and industry is an issue that has been widely discussed in Europe for decades. I does not matter who is discussing it, the final conclusion is always the same – nobody is really happy with it. Insufficient cooperation between universities and industry is a never ending story which is constantly challenging governments, academia, and industry. We could easily understand that less developed countries face this problem in combination with more or less intensive brain-drain and low industrial efficiency, but it is very interesting that similar tones are coming even from the US. At least they have less to complain about, as the US remains a sort of European ideal in this field. The only countries that are not loudly complaining are the Nordic countries. If we are all facing the same problem it is maybe not a problem. It could just be a normal state of the matter. Industry and universities could have unrealistic expectations and different objectives. It greatly depends on the point of view.

To better understand university-industry relations we have to extend discussion to a triangle of academia, industry, and governments (Leydesdorff and Etzkowitz, 2001). Governments are a catalyst that can significantly influence these relations (Bavec, 2006). Particularly in the EU, where in addition to national governments the European Commission plays an important role with its financial incentives and different R&D and regional programs. Even interactions between two players are rather complicated, but when we add the third player than we face an entangled system. In this presentation I will focus this complicated interplay just on the issue of innovativeness. I would also like to make clear difference between innovativeness and innovations. For me, innovativeness is a state of the mind which is influenced by knowledge and social environment.

For the beginning, let us talk about the role and objectives of all major players in university-industry relations (Adhami and Aunon, 2005). Universities are keen to collaborate with industry for different reasons:

- They need research to maintain the highest possible level of academic proficiency in education. The best universities follow the motto “no research, no teaching”. For that reason they are particularly interesting in basic and more pretentious research and much less in very pragmatic applied research.
- On the other side, they already have the largest number of professionals that can perform any kind of research. So it is naturally that they would like to be a key player in this field as well.
- Industry is also welcomed as a source of additional funding. With exception of some private universities all others are under-funded, at least from their perspective.

Industry has much more pragmatic goals and expectations in relation to universities:

- They look for young employees that are immediately employable and functional without additional investments into their professional formation. So, they would like to influence curriculums and make them more pragmatically and applicable oriented.
- But they want something else too. Namely, they would like to identify the most promising students and potential employees in advance. An appropriate preliminary selection of graduates would significantly lower industry’s risk in investments into new employees. In many companies this is the main objective in their relations to universities.

- Industry also needs universities for joint researches in the fields where their researchers are not comfortable enough, or they are indispensable on other tasks. But, industry feels quite uncomfortable if it depends too much on research support from academia. University researchers are difficult to control and manage, so their involvement is limited to selected research problems.

Governments and the European Commission are an important third player, particularly in the European countries with a very high percentage of public universities. In general, governments have more catalytic and regulating role:

- They must maintain and support an educational infrastructure that would provide sufficient number of educated people for all social and economic needs. They are also highly interesting for high employability of graduates.
- The second governments' goal is promotion of university-industry relations to get additional funding for universities and to help industry to acquire state-of-the-art knowledge. Universities are systematically pushed on the "market". Governments and European Commission can dramatically change these relations with focused incentives.

We have an equation with three variables. The question is – how many solutions do we have under present boundary conditions? Can be all objectives fulfilled? A more detailed analysis of individual objectives will reveal that only few of them are common to all players. But there is nothing wrong with that. We could argue that universities, industry, and government have to play their own roles in modern society and any collaboration should be in accordance with these roles. The main role of universities is education, and the main role of industry is to produce something that brings profit. If both worlds find a common interest on particular case it is good for all. Otherwise, everybody has its own job to do.

But there is an issue that is indirectly a common interest of everybody. Many studies (Casey and Brugha, 2005, Florida and Tinagli, 2004) confirm that the main challenge of modern societies is innovativeness. Economic efficiency, industrial growth, social development, etc. are just its consequence. To make story shorter, we could state that the main role of universities is to raise innovativeness in all areas of our society, including industry. There is no innovativeness without knowledge, and knowledge without innovativeness is unproductive and sterile. Real blessings for industry are innovative professionals. In the Central Europe, there is an ongoing dialogue based on conclusion that the main challenge of our universities is to increase innovativeness of students. Some comparative studies show that our students have at least the same level of knowledge as their US colleagues, but their innovativeness in application of this knowledge is significantly lower (Owen-Smith at.al.).

The issue of innovativeness is even more profound in the ICT industry where classical knowledge is fading out so fast that even the best universities and advanced industries have problems to continuously update it. This is also one of the less emphasized findings in the EU foresight project Fistera. Before we make any assessment on the quality of universities-industry relations let us start with a more holistic view on innovativeness.

2. THE ROLE OF INNOVATIVENESS

To illustrate our view, let us analyze and comment innovativeness on a country level. We can easily generalize these results to company levels. The main reason for this macro approach is the fact that we already have data for all European countries. The basic sources of data are the European Innovation Scoreboard, Eurostat, and other European Commission's information sources.

Is innovativeness really relevant for industry efficiency? We will highly simplify the issue and link industry efficiency with the GDP. In the Figure-1 we can se a strong correlation between GDP per capita and national innovativeness (measured as SII - Summary Innovation Index) which is annually assessed by the European Commission. We will not discuss what causes are and what consequences,

but correlation among these variables is evident. It just confirms a common believe that industrial development depends heavily on innovativeness.

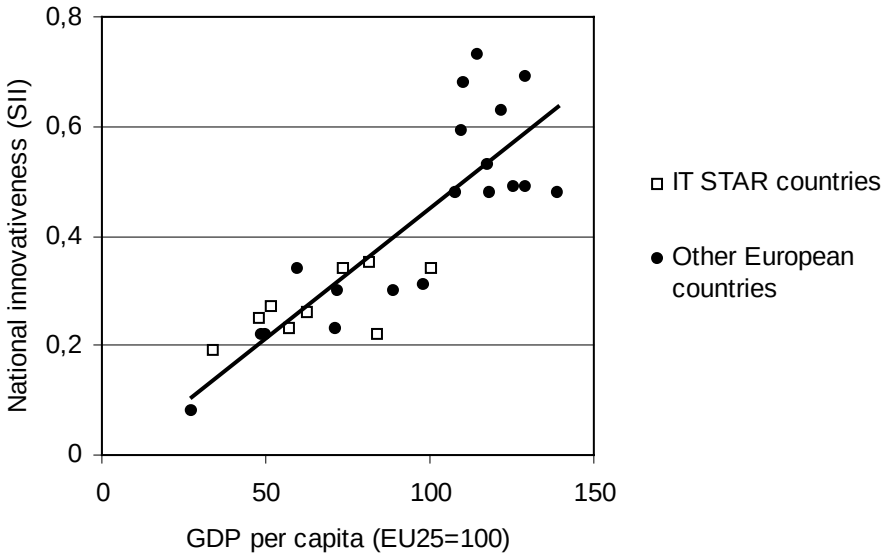

Figure 1: Relation between national innovativeness (SII) and GDP per capita for 30 European countries (individual data: the European Innovation Scoreboard and Eurostat)

Another relevant issue is an effect of R&D investments on national innovativeness. The Figure-2 reveals an even stronger correlation between GERD (Gross domestic expenditure on R&D) and innovativeness. The major part of R&D in European countries is still performed by universities and national institutes, so GERD is an indicator showing investments into universities' R&D. These investments obviously increase innovativeness. We have to point out that GERD in the Figure-2 is measured as percentage of GDP and not in absolute values. It means that even less developed countries can dedicate the same percentage of GDP as more developed, but they obviously do not. One explanation is a low industry investment into R&D in comparison with government investments, and the second is merely a political decision not to do it.

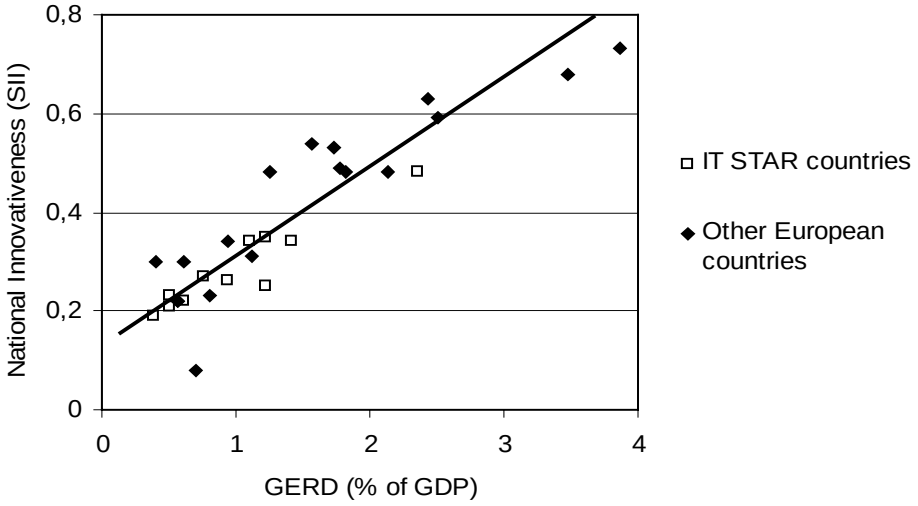

Figure 2: Relation among GERD (Gross domestic expenditure on R&D) and national innovativeness (SII) (individual data: the European Innovation Scoreboard and Eurostat)

Results presented in the Figure-3 are much more intriguing. They show low correlation of 0,5 between investments into spending on human resources (measured as total public expenditure on education as a percentage of GDP) and innovativeness. It leads to an odd conclusion that overall education level has a low influence on innovativeness. The really important things are investments into R&D. With other words, innovativeness is "born" on universities.

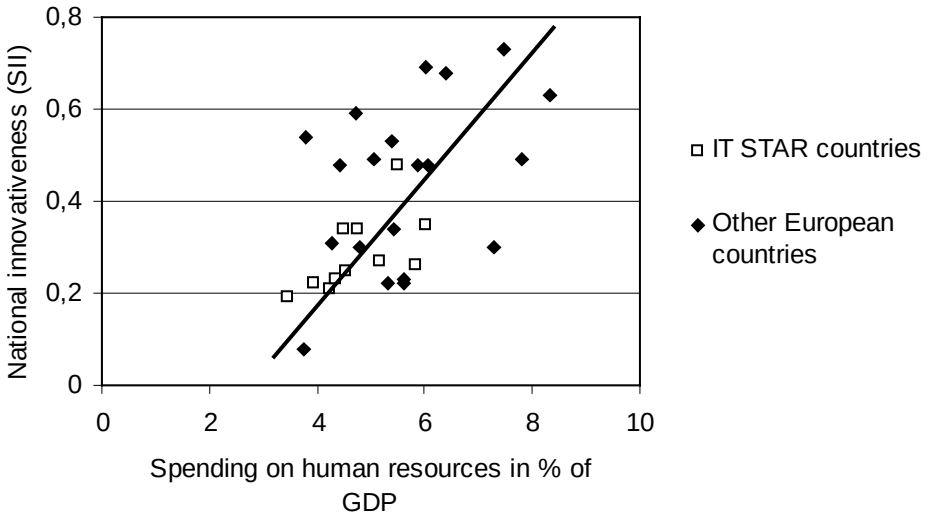

Figure 3: Relation among spending on human resources (total public expenditure on education as a percentage of GDP) and national innovativeness (SII) (individual data: the European Innovation Scoreboard and Eurostat)

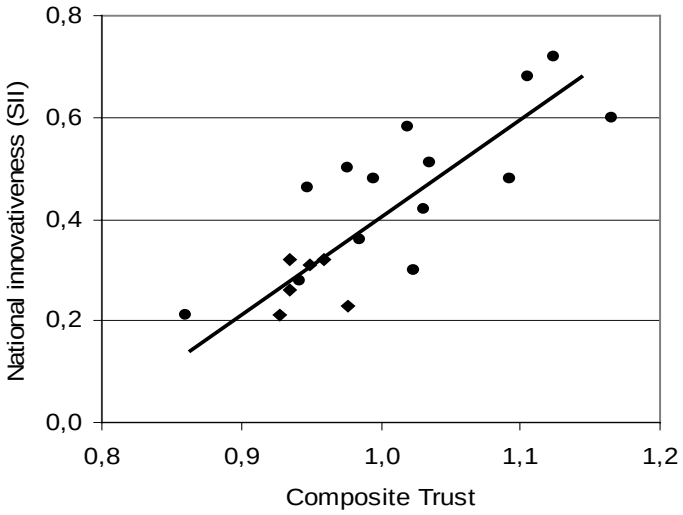

Figure 4: Correlation between Composite Trust and national innovativeness (SII) (derived from individual data from the European Innovation Scoreboard, van Oorschot and Arts, 2005, and Schaik, 2002)

It is interesting to see what else can influences innovativeness. Many researches point on the link between social capital and innovativeness (Bavec, 2006, van Oorschot and Arts, 2005, Schaik, 2002). It is an interesting subject for discussion, but we will present just a relation between the Composite trust (calculated from trustworthiness, trust in institutions, and interpersonal trust based on van

Oorschot and Arts, 2005) and innovativeness. It just confirms believes that social and personal distrust kills innovativeness and that is easier to be innovative in societies with higher social capital. We can see that in Nordic countries.

One of criticisms that we constantly face in our region is too low level of S&T graduates in overall graduates' population. We could argue that industry needs larger number of S&T graduates and that they are crucial for technological development. It is quite a plausible hypothesis, but the Figure-5 reveals relatively low correlation (0,5) between share of S&T graduates and innovativeness. It means that innovativeness is coming from other scientific areas as well.

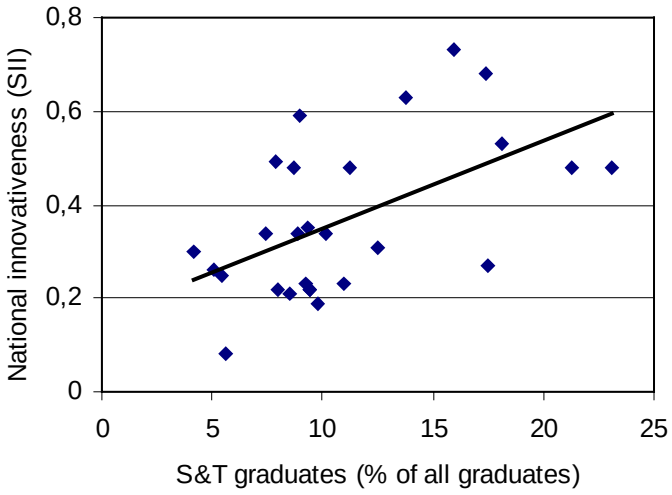

Figure 5: Relation between a share of S&T graduates in overall graduates' population and national innovativeness (SII) (individual data: the European Innovation Scoreboard and Eurostat)

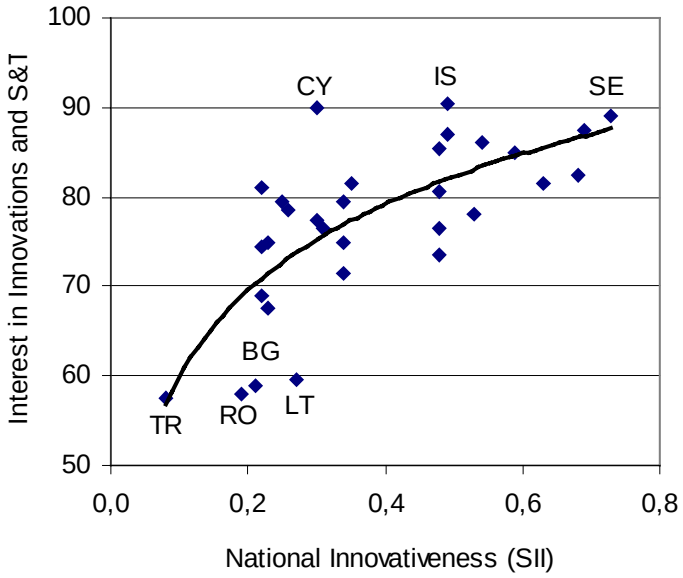

Figure 6: Relation among national innovativeness (SII) and public interest in innovations and S&T (individual data: the European Innovation Scoreboard and Eurobarometer)

It is particularly interesting that public acceptance of S&T correlates with national innovativeness (Figure-6). Studying differences in innovativeness in European countries we see that significant regional dissimilarities can not be explained just by the level of economic development or spending on S&T. Innovative environment are also characterized by "softer" indicators like public perception of innovations and S&T. It is just another confirmation that social capital and social values plays an important role in innovativeness.

If we put this short discussion on innovativeness into a broader perspective we can suppose that these relations are logically similar on the level of ICT industry and even on the level of an individual company.

3. CONCLUSIONS - UNIVERSITIES AND ICT INDUSTRY

We use this discourse on innovativeness as an argument for a view that European universities must concentrate on innovativeness much more than before. This is generally accepted suggestion (Leydesdorff and Etzkowitz, 2001), but too often misunderstood. Yes, innovativeness is about knowledge, but it is even more about how to use the knowledge. It is difficult to learn because it also reflects surroundings in which somebody tries to be innovative. Innovativeness needs simulative environment with high social capital, trust, and many other positive attitudes. We saw that on national levels, but it is not different on the universities' or industry level.

Central Europeans universities lack exactly this simulative environment. This is the main difference between typical European and US university. The best what our universities can do for industry is to raise innovativeness of their graduates. But they have to change environment in which they educate their students. They have to prepare students for group work, establish trust, and open exchange of ideas. Today, studying is still an individual endeavor with very small attention to development of students' social intelligence and innovativeness.

ICT industry is particularly sensitive on innovativeness. It faces rapid technological development that makes knowledge obsolete in an incredibly short time. It also deals with wide spectrum of applications that intensify needs for innovativeness. To be efficient, ICT industry has to be flexible and permanently on the watch for new opportunities. And innovativeness is the only solution for this problem. Innovativeness is obviously the major cross-sections between industry needs and universities mission.

Applied industrial projects are good news for universities without doubt, but only if they do not reduce universities' capability to concentrate on their main mission (Adhami and Aunon, 2005). Particularly in ICT, university teachers and researchers are often in temptation to engage into well paid applied projects with a minimum scientific value. Industry should use universities primarily to raise its innovativeness. Sometimes industry does it intuitively and sometimes intentionally. Many university researchers are included into industry projects, just "to be in touch".

Finally, we would comment the governments' role. Years ago, we met significant differences in their relations to universities and industry from country to country. For example, governments in Nordic countries and UK behaved very different than governments in Central Europe or France. Particularly different were former socialistic countries with introduction of "national" research institutes that operated in parallel with universities. The intention was to release universities from relations with industry and to establish industry oriented R&D institutes. These institutes remain even today, and universities are even more unable to find a common language with industry. The situation is changing with an increasing role of the EU in the area of R&D. As result, particularly in economically less developed EU member states governments are simply following and emulating EU policies. It has good and bad consequences. From innovativeness point of view, we should not lose a touch with national particularities and social values that influence innovativeness in academia.

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