NEW network between industry and Polish universities

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Abstract

The reality in which elementary roles play novelty, inventiveness, innovation, discovery and originality has made its way since the turn of the nineteenth century. It was during this period that the era of independent inventors, researchers, academics and ingenious factory workers virtually ended. The economy of developed countries after World War II was inevitably connected with the implementation of technological innovation as well as marketing, efficient production and financial control. Since the 1970s we observe the decreasing dominance of large corporations in scientific research. A new player in the field of industrial research have proved to be small and medium-sized enterprises, which contrary to large corporations have not been able to develop a broad front of research, focusing on niches and the use of knowledge instead. The factor which gained greater importance in the economy were horizontal integration, organizational flexibility, the mobility of staff (within and between companies), the expansion of forms and scale of market financing , the demand for R & D and higher education, which was becoming more and more massive. All these changes were well known in the USA before they reached Europe. The author of the article presented below carried out a research at the UC Berkeley Haas School of Busines in 2013. Among other things he focused on the problem of cooperation between business and higher education in the framework of the project under the govermental program schedule and came to very intriguing conclusions when he compared expenditures on science and bases of existing networks and institutions involved in innovation and commercialization of technology through various networks. It turns out the USA is an indisputable leadr in this field. It poses a question why Poland, with more than 800 research centers and several governmental agencies, represents such modest results? Another question is why the research units are so inefficient regarding the significant decentralization and autonomy of Polish universities? One of the answers is the lack of organized and accessible system of communication between universities, industry, business and inventors. The solution to the problem seems to be in existing networks, clusters and platforms, each of which represents its incomplete resource information, territorial coverage or the lack of activity linking business and industry.

Keywords: *network, entrepreneurship, innovation, technology transfer, research, business partnerships, innovation leaders, Cibis.*

Since the turn of the nineteenth century scientific research has become a crucial factor in the economic success of various countries. The reality in which elementary roles play novelty, inventiveness, innovation, discovery and originality has made its way since the turn of the nineteenth century. It was during this period that the era of independent inventors, researchers, academics and ingenious factory workers virtually ended. The economy of developed countries after World War II was inevitably connected with the implementation of technological innovation as well as marketing, efficient production and financial control. The idea of growth as the main objective of the company was born after 1900, and the idea of technological innovation as the essence of growth became widespread after World War II, and especially in the second half of the 1970s.

Any kind of twentieth century research business development strategies considered the most valuable assets of the company, which in no way should be sold to other companies. Colleges preferring autonomous ideal did not want to develop close relationships with industry. An exception is the American experience of William Shockley and Frederic Terman, the fathers of the Silicon Valley at Stanford

University, who believed that research can be used by the public when they are not inhibited by the obligation to obtain short-term or specific results. If the decisions about the directions of research were left to the scientists, the results could give back to society and the economy. The dominance of basic research in the linear model of innovation (1945-1975) coincided with the dominance of the USA in the development of science, technology and other scholarly disciplines (i.e. physics) as well as with the increasing role of large corporations as the main engine of technological innovation.

We must also remember about the consequences of the Manhattan Projects and the Cold War. The USA was large and rich enough to carry out research in all areas and excel on all fronts. The Americans were able to utilize their own scientific discoveries in technology and industry. Since the 1970s we observe the decreasing dominance of large corporations in scientific research. A new player in the field of industrial research have proved to be small and medium-sized enterprises, which contrary to large corporations have not been able to develop a broad front of research, focusing on niches and the use of knowledge instead. The factor which gained greater importance in the economy were horizontal integration, organizational flexibility, the mobility of staff (within and between companies), the expansion of forms and scale of market financing , the demand for R & D and higher education, which was becoming more and more massive. All these changes were well known in the USA before they reached Europe. Other factors of the change in research strategy, especially since the 1980s are:

- shortening the cycle of technological products and services, which forced the use of available solutions without waiting for the solutions of company inventors;
- an increase in R & D costs;
- increasing importance of suppliers and customers as sources of innovation;
- the development of the venture capital market and the associated increase in the number of small technology companies;
- a decrease in government funding of universities and public laboratories, forcing them to seek new sources of income;
- an increase in the mobility of highly qualified experts, who took with them closely guarded secrets when they were leaving their companies;
- dissemination of knowledge thanks to new electronic tools (databases, Internet), measured, among other things, by increasing number of patent holders and increasing number of university graduates and PhDs.

A particularly important current factor seems to be a broader interdisciplinary knowledge as well as its universality through digital media information and its exchange. They facilitate the building of relationships between science and business that are strategic for the economy. Recently the subject is discussed a lot, but there seems to be no solutions unless the new financial perspective of the European Union will help the Polish economy to adapt to the rapid changes in the world. This is an introduction to business innovation and close cooperation with the scientific community. As the Polish degree of adaptability is poor, we have a low level of acceptance for the changes in the market. Companies do not use pre-emptive moves, do not create a new reality, they do not perceive innovation as a factor of development.

However, the economic environment and various institutions do not communicate with companies either. It would be a good idea to think about the answers to the questions what should happen that companies realize the potential of research institutions and take advantage of their opportunities, and who should make the first move?

Maybe it should the government that initiates the interaction between business and science. It is also important to know which companies or industries should be particularly interested in such cooperation. Moreover, one has to consider whether there is a common language for companies and research institutions so that they can communicate. Are the support and feedback of already existing methods of communication flexible enough to adapt to the task of substantive business and science?

Do research centers exchange information and ideas how to train their people in the world of pervasive competition? - Science must be open, maybe except for defense and military branches. Scientists meet

and exchange methods. Moreover, the method can be revealed, because the key to success is always in the people.

Poland has made a giant leap and achieved a very high level of public schooling - we have had an unparalleled in history the percentage of people with higher education, which should not be diminished by the fact that many academic teachers complain about the lack of knowledge among the youth arriving at universities. At the same time a fallen prestige of Polish science may also result from strikingly low rate of innovation - new technologies are imported from abroad rather than created in our country. The question is why?

According to the author, the missing element of this system is the lack of interest in a qualified scientist – researcher, usually with a baggage of experience in the industry, or a doctorate (including PhD students). Since the end of the 1990s, the number of doctoral students in OECD countries increased by forty percent and is still rising. Much of the newly appointed doctors will never be able to utilize their skills. The immediate cause of this situation is the wrong policy which has led to a disproportionate growth of postgraduate schools, overproduction of the holders of an academic title and the rapid saturation of the labor market, both academic and industrial. This phenomenon slowly rises to the rank of a global problem. In April 2011, the journal *Nature* published an alarming report showing the general outline of the situation in the world. [2]

Against the background of the general situation, the perspectives for Poland do not look well. We are affected by the problem of established Western countries, involving overproduction of qualified graduates, and the problem of countries in the phase of rapid economic development, associated with a low level of science. Since the moment it occured that education can prove to be quite a profitable business, There emerged not only private universities, but also extramural PhD programmes. Even their names arouse anxiety. In the early 1990s universities across the country trained the total of 2,695 doctoral students. In 2009 the figure was over 32,000. [2]

Now let us examine the development and determinants of innovation and R & D in terms of the relationship between science and business.

University - industry relationships :

- increasing pressure for universities to help to improve the national economic competitiveness
- growing number of government initiatives to promote „translational research”
- public-private research partnerships
- changing the legislative environments

The author of the article carried out a research at the UC Berkeley Haas School of Busines in 2013. Among other things he focused on the problem of cooperation between business and higher education in the framework of the project under the governmental program schedule and came to very intriguing conclusions when he compared expenditures on science and bases of existing networks and institutions involved in innovation and commercialization of technology through various networks.

Comparing the financial expenditure on basic research R & D in the USA, Poland and other countries came to the conclusion that the USA is an indisputable leader in this field. But when we looping for participation of business firms in funding of university R&D (%) – advanced countries we change our mind:

Table 2. Participation of business firms in funding of university R&D (%) – advanced countries. [1]

Country/region	1991	1999	2007
US	5.3	6.3	5.1
Japan	2.4	2.3	2.6

Germany	7.6	11.3	8.7
UK	7.8	7.2	6.5
EU	5.9	6.9	6.4

In contrast, in developing countries it looks like this:

Table 3. Participation of enterprises in funding of university R&D (%). [1]

Country/region	1995	2000	2005
Argentina	25.9	25.9	32.2
Brazil	42.6	40.1	40.2
Mexico	20.8	29.8	46.5
Latin America	35.9	34.1	39.5
South Korea	73.1	74.0	76.9

As you can see, in these countries the segment of innovation and commercialization of R & D is undoubtedly part of stimulating progress and has a significant share in the national income. Now, let us look at the development of innovation in Europe.

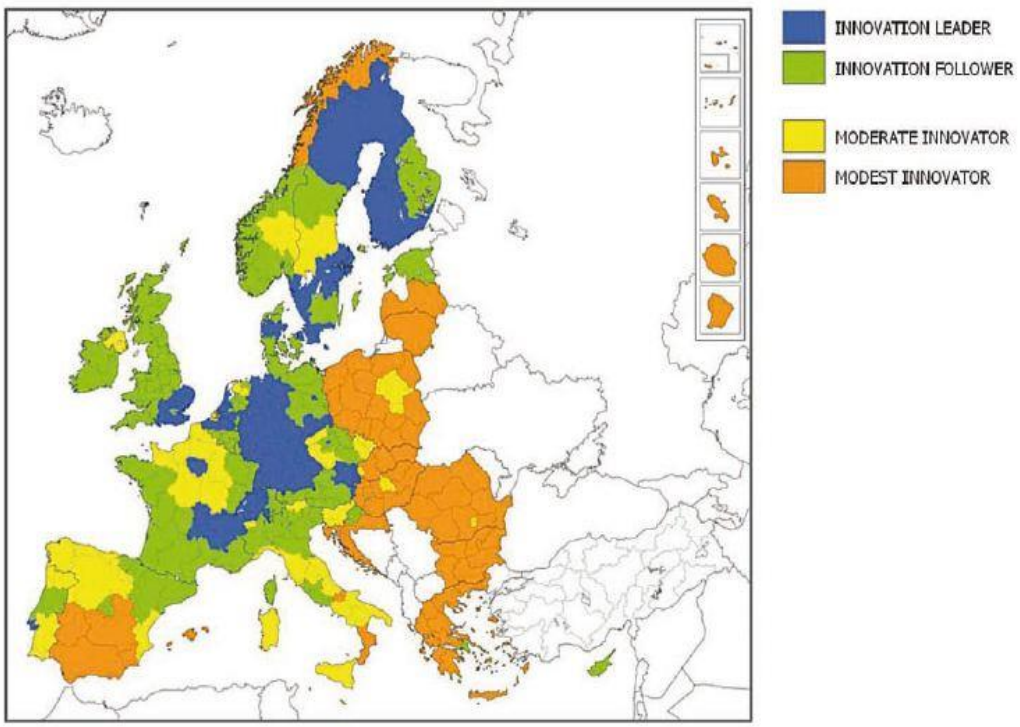

Figure 1. European Innovation Leaders 2013. [1]

The EU Innovation Scoreboard of 2013, Member States were divided into four groups:

- leaders of innovation (Innovation leaders): Sweden, Germany, Denmark and Finland - are the countries that achieve results well above the EU average;
- overtaking countries leaders (Innovation followers): the Netherlands, Luxembourg, Belgium, United Kingdom, Austria, Ireland, France, Slovenia, Cyprus and Estonia - all achieved results above the EU average;
- moderate innovators (Moderate innovators): Italy, Spain, Portugal, Czech Republic, Greece, Slovakia, Hungary, Malta and Lithuania - the results below the EU average;
- innovators with modest results (Modest innovators): results in Poland, Latvia, Romania and Bulgaria are much lower than the EU average.

This raises the question: why Poland, possessing more than 800 research centers and several government agencies such as PARP, NRDC, NCN represents such modest results?

Figure 2. Government institutions supporting the development of innovation and R&D (author)

Figure 3. The number of business and innovation centers (author).

This raises the question how such a small efficiency of these units when so many and so significant decentralization and the autonomy Polish universities.

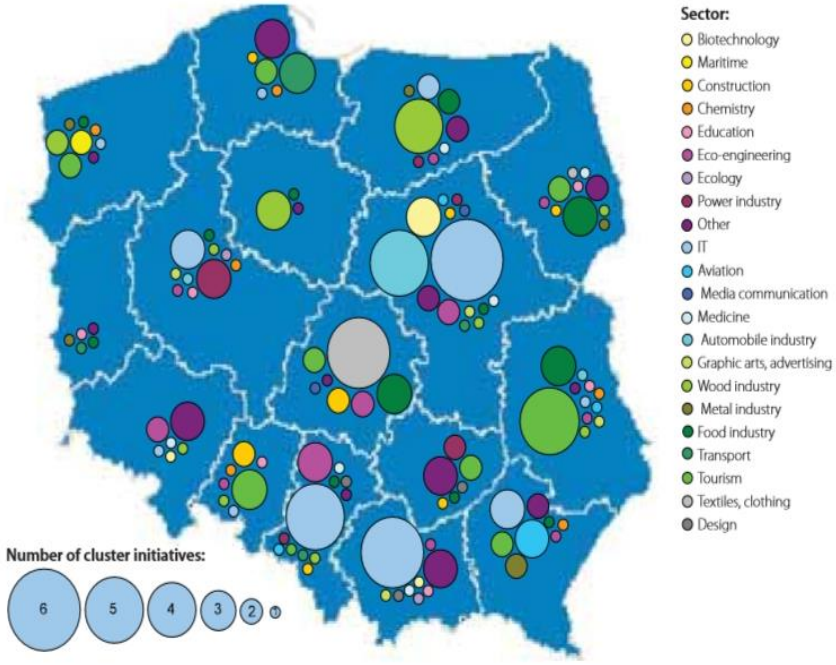

Figure 4. Sector structure of cluster initiatives in Poland (author).

The conclusion shows the lack of organized and communal system of communication between universities, industry, business and inventors. The problem seems to be connected with the existing networks, clusters and platforms, each of which represents its incomplete resource information and territorial coverage, or the lack of activity linking business and industry. Let us show the existing network in Poland, trying to describe their objectives, resources and activities:

Network Sunrise - Network on the edge of Science and Business

Very small network, connects users from various branches of industry; Contains also some information about start-up funding, links to post-production waste buyers/sellers network; Presumably "dead" – last entry 10.2012

Network Eureka - More advanced look on networking. Semantic network of experts and competences, too bureaucratic, institutional, not very popular, politicized.

Network ResearchGATE - advanced view on scientific networking ResearchGATE is an international, free social network, addressed to scientists of all disciplines. Users create personal profile where they have the opportunity to publish their research papers, lectures, papers and articles. The network of a rather social character.

As you can see, each of these networks operate independently according to their own structures, objectives and areas of research, however, it is not meeting the basic standards a platform bringing together scientists, inventors, business and industry should have. Hence, the author proposes to base such a network on university graduates holding their master or doctoral degrees, as they make a unique resource of knowledge, experience, enthusiasm, inventiveness, and being in the initial phase of their development they are determined to gain success. Let us call it conventionally Uni-net. The basis for these actions are relationships between:

- Research Gate – base
- Alumni (bi-annual meetings)
- Business Gate - base
- Uni Business ←> BusinessUni (bi-directional)

Its graphical functional diagram is represented by the figure below:

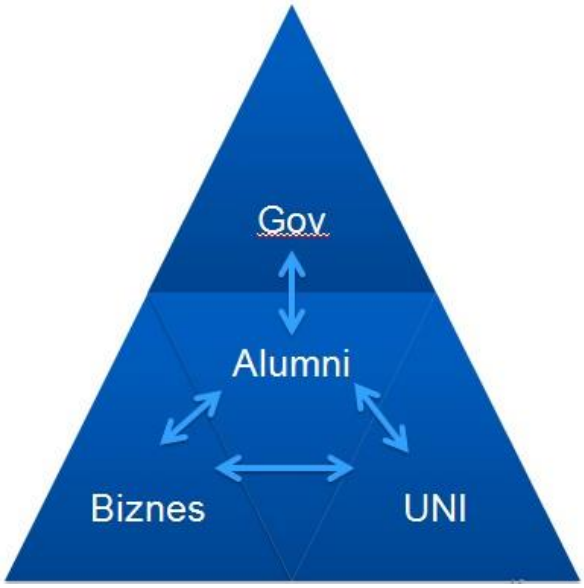

Figure 5. Graphical diagram (author).

Such a network system performs both the needs and goals of graduates and other members of its structure, for example:

- BI-annual meeting (Spring and Autumn)
- UNIversity specific
- BusinessMixer
- Research/Job Opportunity

Individual tasks and scopes of action can be explained by the diagram below.

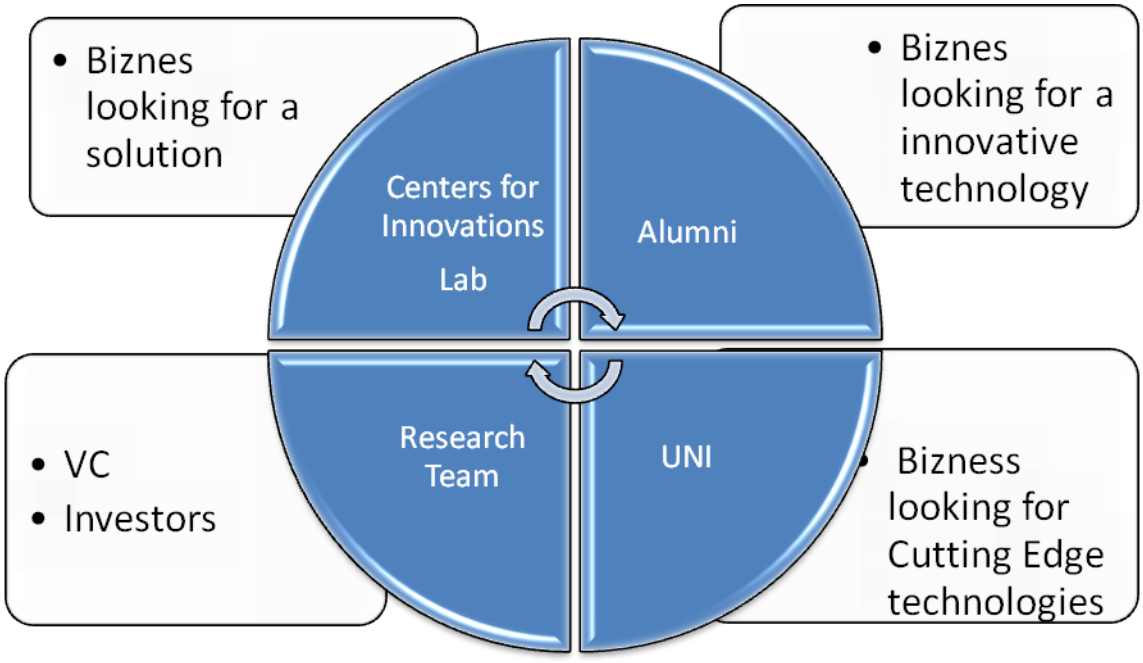

Figure 6. UNINET university – stock interexchage (author).

In contrast, the following diagram shows the relationship between senior development measured by the number of copyright and the development of scientific research, i.e. senior network at certain phases of its development.

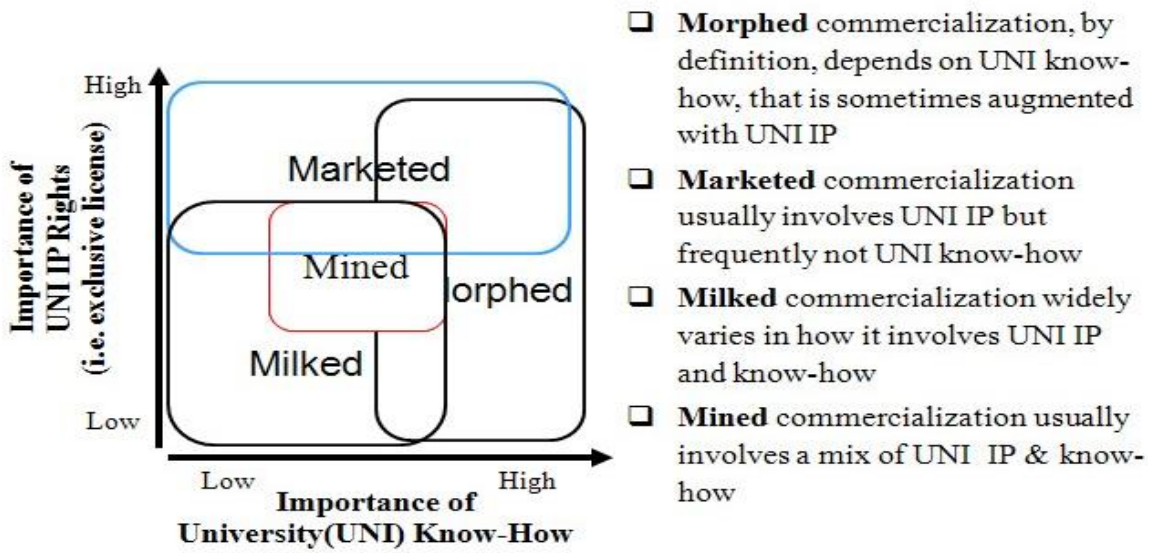

Figure 7. UNINET- research gate (author).

Finally, let us discuss the expected effects of the activities of such a network using ready-made components and human resources with great potential for research, science and production in relation to the industry:

- increasing patenting propensity by universities
- growing revenues from licencing
- growing number of researchers engaged in entrepreneurship
- increasing share of industry funding
- diffusion of technology transfer offices, industry collaboration support offices, science parks

Conclusion

1. Overwiew all development and innovation centers (now 821) and undertake decision to reduce their number to eg. 150, by:
   - consolidation – good results and opinion of board work,
   - administrative reduction- bad results and opinion of board work,
2. Increased resources for R&D by co-operation between Poland and neighbor countries.
3. Increase investment in human capital, especialy in PhD programmes, which each year is about 7 000 (in 2009).
4. Create strategic vision to improve commercialization of R&D activity.

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