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ABSTRACT

The paper aims at describing the delicate matter of the relations between science and business units. Should the enterprises be encouraged to use the research outcome of universities, independent research and development units, Think – Tanks and other science – oriented organizations or should both sides develop independently? What should be the role of state in these contacts? The basic assumption of the paper is that a knowledge exchange should be based on short-, middle-, and long – term profits that could be realized by its both sides. The research lead by the authors on a group of Polish universities and companies focused on identifying the qualities that R&D units could possibly offer to business. The second area of concern was the elaboration of mechanisms of knowledge transfer including an appropriate remuneration for the scientific side. Basing on this research the authors reached a conclusion that an intermediary unit operating in between the science units and business organizations is necessary. Its main features and tasks, including the financing possibilities have been presented in the paper. The awaited outcome should be a stable knowledge exchange system, dynamically adapting to the market needs, but also leaving the scientists some freedom for choosing their research topics. This should prevent a situation where all the research would be business – oriented and possible exclusively after a direct order placed by a company.

Key Words: *Research Commercialization, University Management, Research Financing*

1. B2R & R2B RELATIONS - EUROPEAN APPROACH

In March 2000 the European Council during its meeting in Lisbon has set up the Lisbon Strategy, know also as the Lisbon Agenda or Lisbon Process. The document aims at making "the EU the world's most dynamic and competitive economy" by year 2010. This goal should be *inter alia* achieved by a growing innovativeness of the European knowledge – based economy and the creation of the European Research Area (ERA). The combination of these concepts poses immediately the question whether and how these ambitious objectives could come into force. The authors of the present paper strongly believe that it cannot be achieved without an effective and sustainable cooperation of private economic and public scientific sectors of the EU Member Countries. This assumption can also be found in the main European instrument for the realization of the Lisbon Agenda, which are the 6th and 7th European Framework Programs (EFP).

Although EFP seem to be a good step on the way to fulfilling the Lisbon Strategy objectives, its realization in practice failed to make it a real milestone and met some severe criticism. When most of the critical opinions about FP6 point out the fact that its outcomes are far from the ones expected, these about FP7 mention that it seems to give more signification to the documents justifying the necessity of a given R&D task instead of focusing on scientific research itself. Other censorious comments have been addressed towards the promoted by both FP6 and FP7 Excellence and Innovation Centers and Entrepreneurship Incubators – in fact there is no clear evidence these units truly contribute to the forming of new innovative businesses and constitute a real incentive for economic growth and development.

As already mentioned, the authors see a possibility to overcome these difficulties by an appropriate linking of R&D units and business organizations in order to lead the research in directions promising a commercialization

possibility. This would assure a source of financing for the scientific side on one hand and would guarantee a commercialization – oriented research on the other, although it creates the risk of limiting the scientific development to "applications per demand" only. The United States research financing model proves that B2R and R2B solutions can be fruitful for both sides. Also some of the Asian universities, mainly those located in Taiwan and Hong - Kong show promising signs of activity in this field.

2. R&D UNITS VS BUSINESS ORGANIZATIONS

At first sight, the relations between R&D units and business organizations seem to be burdened with divergent goals. This is due to the fact that the science units constitute a ***pure supply side*** which:

- In general is *not inspired* by companies, however there are examples of commissioning research by Business Organizations;
- Involves scientific research that is carried out for purely *scientific self - development* of the researchers. Commercialization is not in the picture;
- Is subject to *internal competition* only;
- Seeks for a *benchmark* merely in its closest environment. Lack of external point of reference causes stagnation and slows value – added growth.

Because of the above a ***Supply Enclave*** is being created. Its search for financing possibilities is caused only by the need of surviving and preserving the *status quo*. A *Supply Enclave* provides no incentives for selling the results of its research, therefore any research commercialization comes not into question. It is possible to name various reasons for this, but in authors' opinion the main negative factor would be in most cases an ineffective national science financing system. Its main defaults are the following:

- *Centralized decision – making process* when accepting or rejecting the grants for financing;
- Expensive and complicated *Patent Protection*, partly caused by European law regulations;
- *Copy- and patent rights* belong to the institution or the person that covers the patent protection costs. In case of international patents these in most cases are hardly affordable for the author, who searches for an institution ready to cover them. In exchange, this unit acquires an important part of income or the entire patent rights, which puts the author in an uncomfortable position in terms of executing his rights – he can make use and draw profits of them, but exclusively within the scope of the agreement signed with the institution in question. This often means a very limited access to the fruits of researcher's scientific work, which can be highly unmotivating for the future.

As the effectiveness of Research to Business cooperation depends on both sides, a closer look should be addressed to the enterprises' as well. In fact, the business organizations do not differ much in their behaviors from their scientific counterparts. By being a ***pure demand side***, the enterprises also create an enclave. The reasons for this are numerous:

1. They are using mainly their *internal* innovative solutions and R&D units.
2. Innovation comes mainly as a direct effect of *spying* the competing companies.
3. Most enterprises show a non – existing or very low *Think – Tank* culture.
4. They do not posses, neither search for information on research areas lead by their science partners.

The above poses three types of threats:

Ad 1. As more and more companies prefer to resign from their own R&D units because of very high maintenance costs, their innovativeness level decreases. Therefore they do not perform any R&D on their own, at the same time the R&D outsourcing proves problematic, which is mainly due to the fact that gaining the effects of external science units' work is difficult. The reasons, among which the lack of incentives for commercialization is seen as most important, have been presented above, in the chapter devoted to R&D units.

Ad 2. Business organizations, alike the science ones, are searching for *benchmarks* exclusively in their closest environment, which results in a ***Demand Enclave*** being created. The negative effects of such an enclosure are very similar to those of the *Supply Enclave*, leading to marginalization of innovativeness and as a consequence a gradual decrease of competitiveness at regional, national, European and world level.

Ad 3. Due to the fact that in past few years European Think – Tank institutions only started to grow and are taking their first steps in various forms of research activities, most of the entrepreneurs share a common opinion that searching for complex solutions and problem solving in cooperation with independent R&D units or in frames of ERA network proves expensive and rather ineffective. But it does not necessary have to be the case! The authors believe that their solution proposal presented in chapter 5 should be considered as a possible remedy to this situation.

Research lead at national level shows that an important reason for an impeded communication between R&D units and business organizations is often the lack of a coherent *National Innovativeness Support Program*. The authors' genuine Polish experience proves it strongly, however, some positive signs can be observed. The recently published Regional Innovation Strategy for the region of Malopolska for the years 2005 – 2013 shows that the local authorities can play an active and positive role in developing the regional innovative potential. Other regions showed interest in following this path as well. Moreover, the *Innovativeness Support Law* is being prepared at the governmental level and the decentralization of decision - making process in *financing of purpose - oriented grants* is taking place, mainly in field of technology.

Last, but not least, neither the European Union, nor most of the European Countries have developed any widely recognized *Science – to – Business Institutions* that could be named as representative for the whole area. This problem affects both the *supply* and *demand side*. The German examples of Deutsche Forschungsgemeinschaft, representing science and R&D units, and Deutsche Industrie- und Handelskammer, representing business organizations, indicates that the communication between these two groups can be facilitated exclusively when *one* intermediary institution exist, however it is compulsory that it is treated as a reliable negotiation partner by both *supply* and *demand sides*.

In spite of all there are examples proving that cooperation between universities and enterprises can bring outstanding effects, although different types of incentives for cooperation can be observed. When the American science financing system with colleges having their business "patrons" and sponsors focuses on acquiring possible income form outside, the example of Fachhochschule Münster in Germany proves that internal incentives can also bring positive effects. A *Science Marketing* concept implemented there is basing on one main assumption: the more third party money acquired by a university department, the more office space and other facilities, as well as research grants are available for its employees. Table 1 shows likely profits from such an exchange for universities and enterprises.

Table 1: Possible cooperation profits for universities and enterprises

Universities can gain:	Enterprises can gain:
Third party money for research financing	Source of potential ideas for commercialization
Business experience for the university staff	Access to large R&D networks (cooperation between universities)
Additional information channel	Additional information channel
Connection to the market	Possibilities of outsourcing of problem solving processes
Extra income possibilities for the researchers	Potential young, well educated and highly motivated employees
	Prestige

Source: *Authors' own study*

3. THE ROLE OF THE RESEARCHER IN S2B CONTACTS

The existence of Supply and Demand Enclaves implicates the occurrence of two types of scientists that would show rather contrary behaviors. The authors want to stress at this point that the presented researcher models are a necessary simplification for the needs of the present paper.

- 1st type – Researcher – Manager: is in constant search for a good business in order to finance his scientific activities. The research itself is just another economic good, ready to be sold to anyone that would provide

money for further research. The ideal situation occurs when a company places a direct R&D order. A strong primacy of praxis and managerial approach over science can be observed. Researchers – Managers are more likely to be found in American science organizations, where most of the funding comes from private sector.

- 2nd type – Pure Researcher: his absolute priority are his own visions and scientific searches. He always lacks of funding, but searches for it mainly in national or regional budgetary funds, public institutions or external grants (i.e. European Union R&D programs). Business contacts and financial contributions are less likely to happen. Research commercialization falls outside his scope of interest, in extreme cases can be even seen as immoral. This model is predominant for post – communist countries, but can also be found in many European and Asian Countries.

None of the two researcher's types presented above should be seen as faulty or undesirable, but both are far from being ideal. When the Researcher – Manager seems to show too little interest in main field of his activity, which should be scientific research, instead of earning money, the Pure Researcher is an idealist living in a closed universe, far from complex economic and social reality of present times, writing mainly theoretical papers without any links to the market. Probably a rapprochement of the two positions will happen, but in authors opinion these processes should be moderately modeled by the authorities in order to avoid pathologies to happen. One could imagine a situation where the public – private partnership degenerates into a financing of private R&D needs, when a company questions the researcher with a given R&D problem and the last one applies for public funding of this research. This is where the authors see a field for application of their Public Trust Institution, described in the following chapters.

4. DO WE NEED A BRIDGE BETWEEN RESEARCH AND BUSINESS?

One of possible solutions of the problems presented above could be an intermediary institution between the science units and business organizations. The following paragraphs will be authors' proposal of a set of features describing a model unit of this type. Taking into account the existence of many contact brokers, the presented institution should definitely not be just another agent linking particular science and business partners. Its main task would be to create a framework for a fruitful cooperation between researchers and entrepreneurs. From the beginning it should obtain an initial credit of trust and confidence from both scientific and business sides. Other basic assumptions are the following:

- It should have a *clear institutional form*;
- Its goal would be to create *real added value*, instead of being just an another bureaucratic institution;
- It must have a very *positive social perception* in both *supply* and *demand groups* by being known for its high standards and trustworthiness;
- It could hire *science and business professionals* who have a *high level of social esteem* in both groups. These people should derive from *different backgrounds* – budget and business units, private and public sector, governmental and non – governmental institutions;
- The key and strategic role of the new institution is to *create the border conditions for innovation transfer* in its area of activity (region, country, intergovernmental organization). It should definitely not be just a *contact broker*.

Another fact in favor of the creation of an R2B2R intermediary institution is the threat of changing scientific research into a regular market product. A situation where the researchers would lead their studies only after an order placement from some business organization is contradictory to scientific spirit and must not be encouraged. It utterly does not mean that the 1st type Researcher – Manager should step back from his contacts with business praxis, but the centre of gravity of his scientific and economic activities should be clearly defined. On the other hand, the 2nd type Pure Researcher would become the opportunity of focusing on his scientific work, due to obtained managerial help. In exchange he would have to lightly adjust his research subjects to the market needs signaled by his Public Trust Institution. Its main features have been described below.

5. SOLUTION PROPOSAL

A **Public Trust Institution** (PTI) is being created:

- The legal form of the newly created institution should be conform to international law and based on national *public – private partnership* laws. A possible model of activity could be a *public – private partnership joint venture*. The consecutive enforcement of the existing European regulations in this field in all EU Member States is promising.
- PTI's financing should derive from both partners. Although it seems that the financing from the private sector would be much easier to obtain, public funds are necessary as well. This part of funding would come from national Ministries of Science and Ministries of Economy and will consist of a redistribution of funds available in the *purpose – oriented grants budget*. The delegation of resources, decision making and responsibility in this area should follow absolutely.
- The ideal form of funding from private sector would be *dividends* that innovation users yield to patent owners i.e. the 'producers' of innovation. The proposed institution could operate on the basis similar to artists' licenses, where the user pays a regular subscription to a central institution which guarantees the transmission of funds to the authors. This solution would also solve the problem of possession of knowledge created on PTI's demand – as the innovation would be available to all subscription buyers, there will be no need to discuss its private or public character. As it has been a rather delicate issue, a sound and clear juridical framework of such a solution should be established.
- The newly created institution would manage the *entire regional purpose – oriented grants budgets*, being at the same time the only executive power in terms of funds allocation.
- It would be able to allocate a part of regional infrastructure development funds in order to support the creation of innovative businesses. This activity should be lead in cooperation with existing Special Economic Zones, Science & Technology Parks and Business Incubators.
- The PTI should have an active and effective influence on the *direction of scientific research* led in its region – by disposing the research grants for purpose – oriented projects, accordingly to the structure and preferences of regional production potential.
- In cooperation with national Ministries of Science and the regional authorities, the PTI should co - elaborate the *medium-* and *long – term scientific and industrial regional development strategies*, being at the same time the main decisive organ in this area. In example, in tourist regions the scientific research and the development of industry should be directed towards clean technologies in order to preserve the region's cultural heritage and maintain its attractiveness for the visitors.
- The institution would be responsible for taking decisions on *accepting and rejecting individual R&D projects*. The authors believe that an institution operating in a given region possesses much more precise information on the peculiarities of its industry and development as any central authority.
- The PTI should indirectly contribute to *creation of new work posts*. This goal would be provided by assuring best development conditions for industrial sectors through supporting the necessary research. Necessary in this case means potentially beneficial for newly established small and medium – sized enterprises.

The examples below come from authors' mother region, which is the Polish Province of Malopolska:

1. Recently, Krakow has become known for its achievements in outsourcing of accounting services. During the past few years many international corporations, i.e. IBM, PriceWaterhouseCoopers (Cap Gemini), Lufthansa and Electrolux, have moved their accounting centers over here. Bearing the above in mind the Malopolska PTI should provide support for research in accounting and in other related fields of knowledge such as:
    - accounting software;
    - architecture, i.e. intelligent buildings purposefully designed for Accounting Centers;
    - development of technical infrastructure, i.e. secure computer networks, data backup and automated archives, burglar – proof devices, etc.;
    - crisis management, i.e. world – wide accounting activities that may be helpful in lowering the effects or even preventing hackers' attacks on corporate accounting servers;
    - assuring a sufficient number of accounting professionals, computer specialists and other experts by giving incentives to higher education institutions to train young people accordingly to the local market needs, including the necessity of improving their foreign language skills.

2. With car manufacturer MAN establishing a new truck assembly line in Niepolomice (Malopolska, Poland) and French car parts supplier Valeo that is opening further production plants around Krakow, the PTI's role would be to allocate its founds in:
    - purpose – oriented grants for scientific research in fields related to automobile industry;
    - development of spare parts suppliers' potential;
    - providing necessary infrastructure;
    - improving the overall innovativeness of the entire Malopolska automobile sector.

Numerous examples from the World prove that well managed regional clusters can become very competitive areas. We could name here the American Silicon Valley, Asian Taiwan, as well as Chinese cities of Hong Kong and Shenzhen. Again, differences can be found in different types of incentives that would bring innovative companies to the given area, but easy access to knowledge will definitely be one of the most important factors. Also the growth potential of young enterprises seems to be much higher in places where the exchange of knowledge is facilitated.

6. CONCLUDING REMARKS

The authors would like to stress the fact that the main purpose of the proposed Public Trust Institution would be to *model the juridical and economic environment* in order to create favorable conditions for commercialization of effects of scientific research. An intermediary mean of achieving this state of arts would be the rapprochement of behaviors of presented two types of researchers: Researchers – Managers and Pure Researchers. Playing just an intermediary role between the innovation demand and supply sides is far from being satisfactory. Its public utility goal should be clear as well, as the authors understand the PTI as a non – profit organization.

Moreover, one should not confuse the proposed institution with Science and Technology Parks. These are platforms for cooperation between local high schools, science and advanced technology promotion centres and the potential investors, where all the partners have their strictly defined roles. High schools should provide a sufficient number of well educated and highly specialised personnel as well as management and organisation specialists. The science and advanced technology promotion centres should provide the technological and scientific know – how along with a constant technological and scientific development of the young company. This task is being accomplished by supplying information on the latest achievements in fields of research conform to enterprise's profile. The investor's role is to allocate his funds in most interesting and promising projects. The role of the Science and Technology Park is to provide necessary buildings i.e. office rooms, assembly rooms, office infrastructure and organizational assistance. But their role ends at this level. Even if Science and Technology Parks improve the innovativeness of local businesses, they do not have the means necessary to change the regional legislation and economical environment. Nonetheless, their role should be seen as very positive.

Another connotation that automatically comes to mind is the resemblance of PTI to *regional clusters*. In authors' opinion, regional clusters could become a convenient, yet not sufficient tool for achieving PTI's goals. Creating areas that bring together enterprises operating in the same field will definitely improve the flow of innovations, which has already been observed in Science and Technology Parks. However, a success in this field should not obscure the medium- and long – term objectives of the PTI, which are the creating a dynamic innovation – friendly economic microenvironment in order to allow a continuous R2B & B2R cooperation.

Last, but not least, the PTI should not become an obstacle to free and unrestricted development of scientific research or entrepreneurship in fields and activities other than those currently supported or promoted in the given region or country. The founding of basic research, as well as national and other grant budgets, would remain at the discretion of national Ministries of Science and Ministries of Economy.

The authors believe that the problem of improving the communication between R&D units and business organizations can be solved by the proposed Public Trust Institution. Such a body would contribute to the creation of an innovative and entrepreneurship friendly environment, it would also be able to positively influence the regional long – term development strategy. The proposed institution should be considered as one of the possible solutions for finding the *Bridge* between the innovation supply and demand sides.

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