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# How Important Role do Universities Play in Open Innovation?

Insights of an Inter-regional  
Empirical Study

Working Paper



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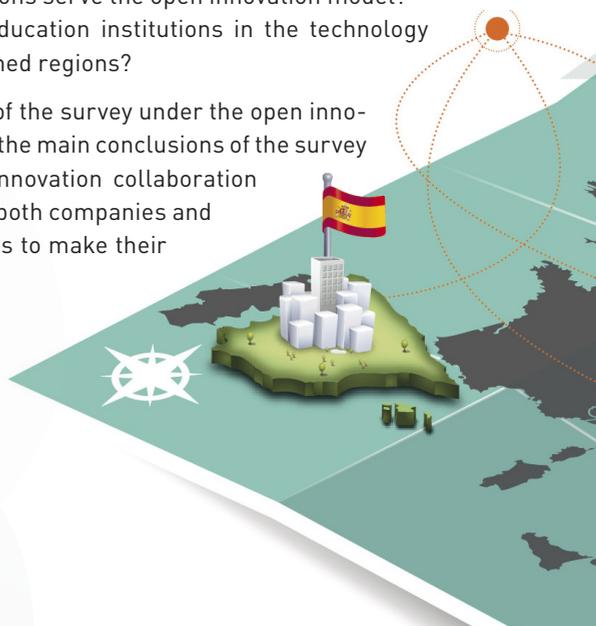
# 1. Introduction

This paper is a report of the results of an empirical study carried out within the “Open Research Platform” (ORP) subproject of “European Collaborative and Open regional Innovation Strategies” (EURIS), which is an inter-regional cooperation project co-funded under the INTERREG IV C Programme of the European Regional Development Fund (ERDF). The main objective of the ORP subproject was the development of an electronic tool to improve collaboration and communication between business and academia under the open innovation paradigm. The tool is an information platform that enables regional actors, such as university institutes, research organizations and companies to structure and exchange their innovation relevant knowledge in a user-friendly way and to tap into the intellectual property rights (IPR) potential of the regional knowledge.

In the frame of this subproject a survey was carried out to investigate companies’ technology transfer practices with universities in four regions of the European Union, i.e. Navarra (Spain), Lodz region (Poland), Stuttgart region (Germany) and Western Transdanubia (Hungary). In total 144 companies responded to the on-line questionnaire that was available in four languages between January and March 2012 in the aforementioned regions. As a kind of user survey, the main objectives of the investigation were to explore:

- to what extent knowledge transfer activities at higher education institutions and research organizations serve the open innovation model?
- what the role is of higher education institutions in the technology transfer system of the examined regions?

In the first section, the relevance of the survey under the open innovation paradigm is discussed then the main conclusions of the survey are presented. Finally, an open innovation collaboration model is introduced that provides both companies and universities with some suggestions to make their collaboration more effective.



## 2. Open innovation at firm level

The **open innovation concept** originates from large companies that are successful in matching and integrating their own internal research with external sources of ideas and technologies (Chesbrough 2003). The concept is also appropriate for small- and medium-sized companies (SMEs), as they traditionally work with a number of external organizations, mainly with other SMEs. However, findings of exploratory studies point out that those SMEs benefit most from an open innovation approach that collaborates regularly with their clients, customers and higher education institutions.

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Usually, successful companies innovate in an “ecosystem” which is characterized by dense and intensive contacts between actors to get access to complementary resources and to exchange ideas through trusted relationships (Vanhaverbeke 2012).

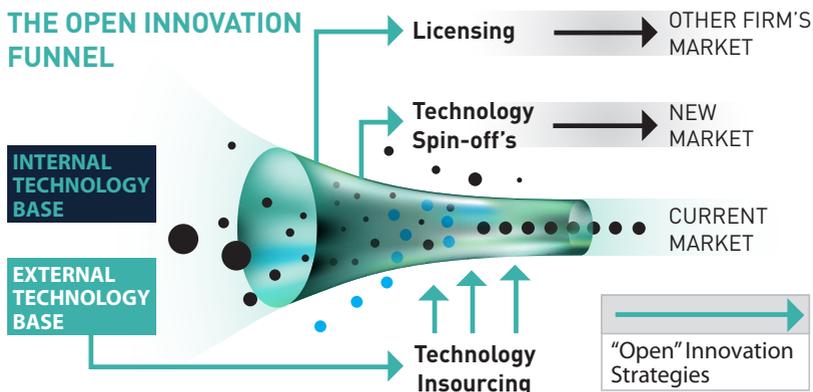
**There is no ideal open innovation strategy.** Open innovation could have various forms and routes, depending on the innovation and actors involved in the development process. Different types of open innovation strategies could be best presented through the “open innovation funnel” (Figure 1) described by Chesbrough (2006).



At any given moment of any given day employees and managers alike come up with thousands of seemingly brilliant ideas. Traditionally, many ideas enter the funnel but just a few exit as new products or services while the rest are weeded out. In the open innovation concept corporate boundaries are porous, depicted by a funnel that is full of holes in which ideas can enter from external sources and can leave the company to external recipients. Over time our thinking is shifting. Often we just recognize some opportunities and elaborate some product ideas around. If they are still interesting and have the backing of senior management, they can be developed into technologies. Of course not all technologies will appear, or at least not immediately, in our products or services. The situation is made more complex by the fact that very often neither the ideas, nor the technologies belong to a particular company but originate instead from external sources.

The open innovation concept denotes the time to commercialisation and the fact that different concepts such as opportunities, ideas, technologies and products have different development cycles and can enter the funnel at different points. The funnel should be recognized as a continuum which can effectively manage: opportunities and turn them into ideas, ideas and turn them into technologies, technologies and turn them into products and services, and products, which can be commercialized.

**Figure 1: The open innovation funnel**



Source: Chesbrough 2006



There are four different routes where companies can implement an open innovation strategy (see also Figure 1):

1. **Tapping on external technology base.** In the early phase of the innovation process companies often realize that external solutions and technologies can accelerate the companies' own efforts. This is a deliberate action taken by companies to obtain R&D externally instead of, or as a substitute for, using their own internal R&D department.
2. **Technology insourcing.** Insourcing is a business practice in which work that would otherwise have been contracted out is performed in house. The most common reasons why companies decide to outsource include cost reduction and cost savings, the ability to focus on its core business, access to more knowledge, talent and experience, and increased profits.
3. **Licensing.** It is a contractual agreement between two business entities in which the licensor permits the licensee to use a brand name, patent, or other intellectual proprietary right, in exchange for a fee or royalty. Licensing enables the licensor to profit from the skills, expansion capital, or any other capacity of the licensee.
4. **Technology spin-offs.** Those ideas a company recognize as not relevant internally, could be spun-out to external companies that will operate on a new market than the parent organization. Spin-offs can also be defined as when a division of a company or organization becomes an independent business.

An important message of the open innovation concept is that there are a number of opportunities to exploit inventions, technologies, etc. either internally or externally depending on the well thought through interest of the company.

### 3. Universities and knowledge institutions in open innovation

The “innovation ecosystem” with its core of companies and supplier networks, also involves different knowledge providers such as universities, research organizations, as well as various intermediaries, for instance, chambers of commerce, innovation agencies and consulting companies. As there are a large number of different actors in the “innovation ecosystem”, they should be able to differentiate themselves and clearly present their offer and services.

In the era of rapid changes in customer needs and ever-increasing speed of production, there are high expectations towards potential collaboration partners. They should be easy to find and approach. Furthermore, it is expected that they react and deliver fast providing the best available quality. This is especially challenging for certain organizations, for instance for universities because they do not always follow the rules of business world.

To what extent are universities prepared for the challenge? What kind of services should they offer to efficiently deliver the expected value for open innovation? Often companies, especially large multinationals have far better research and development possibilities than universities, including their internal knowledge, laboratory equipment and human resources. Apart from and in connection to the eternal issue of scarce funding, universities often have just a couple of professors dealing with a particular subject or research topic that definitively limits their potential to produce solutions for company problems.

An even more important main issue is whether universities can offer the required knowledge in the required format for an acceptable price and meet deadlines? They could become effective collaboration partners in the open innovation world if they cast off their previous experience and outdated models and embrace the open flow of knowledge. This is a serious challenge that requires the renewal or radical change of their traditional modes of consultancy, technology transfer and IPR management activities (Alexander et al. 2012).

There are different opportunities to engage in open innovation search and transfer knowledge from academia to business. In a number of cases, interaction is carried out at individual level, for instance, in the form of consultations or lectures delivered by company employees. There is a great variety among the forms of interaction ranging from ad hoc consultation to joint research activities. Real collaboration is a joint intellectual effort of different persons who work together to achieve common goals. Collaboration can happen within the same organization or across the boundaries of different organizations.

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Most sophisticated forms of collaboration are contract research to solve specific problems and collaborative research, such as joint research projects. Apart from these types, the list of interactions is long which involve forms of joint efforts at individual level, individual-institutional level to the most sophisticated forms defined at institutional level. Table 1 provides an overview of different ways of interactions among key players which are classified according to most common level of interaction (Inzelt 2004).

**Table 1: Level and type of knowledge interactions**

Most common level of interaction	Type of interaction
Individual	<ol style="list-style-type: none"> <li>1. Ad hoc consultations of firm employees at universities</li> <li>2. Lectures of firm employees held at universities</li> <li>3. Lectures of faculty members held at firms</li> <li>4. Regular (informal) discussions between faculty members and firm employees in the meetings of professional associations and networks, at conferences, and seminars</li> </ol>
Individual / institutional	<ol style="list-style-type: none"> <li>5. Buying university research results (know-how or licenses) to use this knowledge or technique in company activities</li> <li>6. Employing faculty members as regular consultants</li> <li>7. Coaching of firm employees by university researchers</li> <li>8. Training of firm employees by university professors</li> <li>9. Joint publications by university professors and firm employees</li> <li>10. Joint supervision of PhD and master theses by university and firm members</li> <li>11. Joint IPRs by university professors and firm employees</li> <li>12. Joint conferences attended by university and company employees</li> </ol>
Institutional	<ol style="list-style-type: none"> <li>13. Access to special equipment of firm/university with or without assistance of owner's organizations</li> <li>14. Investment into the development and operation of university's research facilitates</li> <li>15. Regular acquirement of university research</li> <li>16. Ad hoc consultancy of university employees at companies, a "known solution" to be applied to company problem</li> <li>17. Contract research as formal R&amp;D co-operation to solve specific problems for companies</li> <li>18. Collaborative research, formal R&amp;D co-operations such as joint research projects</li> <li>19. Knowledge flows through permanent or temporary mobility from universities to firms</li> <li>20. Knowledge flows through spin-off formations of new enterprises</li> <li>21. Joint ventures founded by a company and an academic partner to investigate and promote a solution to a problem</li> </ol>

Source: based on Inzelt 2004

**Collaboration and trust among the participating actors** is a key element of knowledge diffusion that should be systematically built up. Before entering into a more sophisticated form of interaction at an institutional level, such as formal R&D co-operation, it is advisable to start with less formal forms of interaction at an individual level to establish mutual trust to prevent misunderstanding of tasks, expected results and of course loss of money and time on both sides.

Coming back to the open innovation funnel and to the four different routes that lead to the implementation of an open innovation strategy presented earlier, universities could make significant forms of contributions to those types. Knowledge and research results produced at various university departments could add value to companies' ideation process with new insights, methodologies, test results and technologies. There are many examples in innovation history of innovative products of companies being built on theories or prototypes developed at universities and public research institutions funded with public money.

**As the matching of knowledge supply and company needs** does not happen without active contacts or facilitation, universities and public research organizations should systematically inventory their research results and present them to companies in a digestible format in order to arouse their interest.

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Besides this, technologies or solutions patented by universities could be exploited by companies, assuming that their agents (e.g. technology transfer agencies or specialized consulting companies) in the system know their role is to help technology transfer and licensing.

## 4. Empirical results, new insights from the project

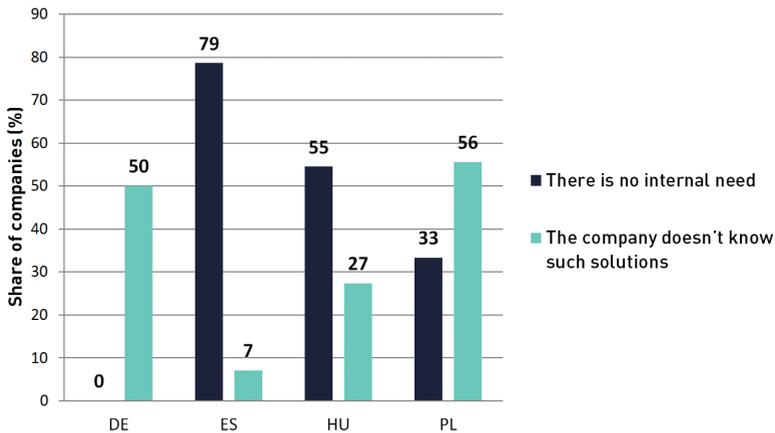
Several questions could be raised to prove the above theoretical considerations and potential pathways of innovation collaboration. The results of an inter-regional survey will be presented as follows to reveal some expectations of companies towards universities that could speed up the technology transfer process. The exploratory research primarily targeted those companies that carried out some kind of innovative activities in the past few years and have some contacts with higher education institutions. In the four participating regions (i.e. the Lodz region, Navarra region, Stuttgart region and the Western Transdanubia), 144 companies completed the common on-line questionnaires. Three-quarters of the respondents are small (41%) and medium-sized (32.5%) enterprises (SMEs with between 50-250 employees), The remaining one-quarter is evenly distributed among micro enterprises and large domestic as well as multinational companies.

**Awareness of open innovation concept.** Although the survey focused on innovative companies, it is rather surprising that the majority of respondents don't really use open innovation practices in their research and development activities. There may be two main reasons for this: the overall low level of innovativeness of companies on the one hand, and the lack of information about open innovation on the other.

**Needs for external resources.** According to aggregated survey data, almost one-fifth of the respondents don't use external resources for their innovation activities. This means that they do not really employ the open innovation concept. Another one-fifth of companies use online databases for their development activities. 15% of the respondents are supported by business support organizations (e.g. chamber of commerce) and the same share of companies uses industrial portals for technology transfer activities. Only 20 companies from our sample indicated they regularly use other external resources for their innovation activities such as other firms, universities, patent agents and local governments or enterprise promotion agencies. Nevertheless, there are significant cross-regional differences concerning this issue. In the Stuttgart region, the industrial portals are the most popular. In Navarra, almost one-third of companies get relevant

information from business support organizations for their innovation activities. Both in the Western Transdanubia and Lodz region, the online databases are the most useful resources for innovation. Hungarian companies are somehow outliers among the firms in the four examined countries as more than a third of the examined Hungarian companies don't use any external resources. In contrast, only 8% of the investigated German enterprises don't use these potentials.

**Figure 2: The reasons for not using external resources**



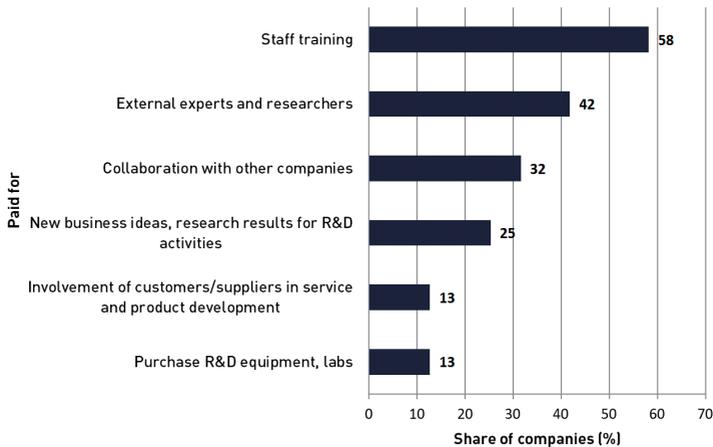
Source: own compilation

Concerning the main reasons behind not using external resources for R&D and innovation activities, the following two factors were identified: no internal need for external information and lack of information about open innovation. Interestingly, one third of the total number of surveyed companies is interested in open innovation, but they are not really aware of such practices (Figure 2). This is a very high share and reveals an explicit need for more active communication on behalf of intermediaries.

**Expenditures for external intellectual resources.** The survey tried to identify those external resources for which companies are willing to pay and basically find relevant for their innovation efforts. External sources could mean staff training, involvement of external experts and researchers (e.g. university professors), collaboration with other companies (e.g. clusters), new business

ideas, research results for R&D activities, involvement of customers/suppliers in service and product development (e.g. living labs) and the purchase of R&D equipment. According to the results of the survey almost half of the respondents have never paid for any external intellectual resources, hence they are quite reluctant to involve external knowledge in any form into companies' innovation pipeline. The companies most willing to accept external input can be found in Navarra, where almost three-quarters of them have paid for some kinds of external resources. The most disadvantageous example is that of Western Transdanubia, where only less than one-third of the companies have paid for such services.

**Figure 3: Expenditures for external intellectual resources for company R&D activity**



Source: own compilation

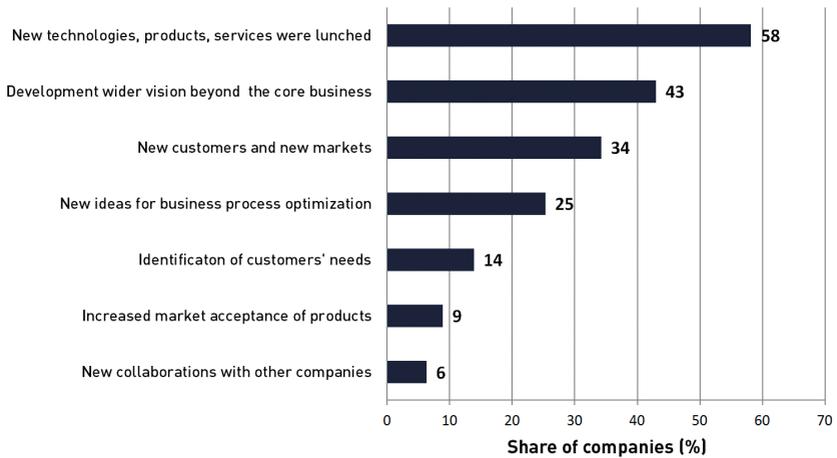
Aggregated data show that most of respondent companies use staff training, external experts and researchers for their R&D activities. It seems that lifelong learning and continuous development of staff knowledge is an important priority of respondents because more than half of the enterprises sent their staff to some form of higher education institution training. About 40% of companies which paid for any external intellectual resources also involved external experts and researchers (e.g. university professors) into their innovation activities. In

this respect companies in Western Transdanubia are the most active, 86% of the Hungarian respondents contracted external experts and researchers. In contrast, only 24% of companies took this opportunity in Navarra. According to aggregated data, one-third of the respondents collaborate with other companies (e.g. clusters). The highest willingness for cooperation (75%) could be observed in Stuttgart region. The rate is significantly lower in Navarra (24%) and in Western Transdanubia (29%). Taking into account all responses, one-fourth of the companies incorporated new business ideas and research results for R&D activities that originate from external resources. Only a small part of the companies involved customers/suppliers in service and product development (e.g. living labs). Interestingly about one-tenth of surveyed companies purchased R&D equipment.

There are several advantages for companies to use external resources for their R&D and innovation activities.

**Advantages of external resources.** More than half of respondent companies (58%) launched new technologies, products and services according to their responses in the past few years. Almost the same share of respondent companies was able to develop some kind of wider vision beyond their core business. One-third of the respondents could conquer potential customers and new markets. One-quarter of the companies received new ideas for business process optimization. Responses of companies clearly prove that there are several advantages for companies to use external resources for their R&D and innovation activities. We can conclude that the majority of companies are aware that collaborating with other organizations pays off although the perceived benefits are not the same across the sample (Figure 4).

**Figure 4: Perceived advantages of external resources**



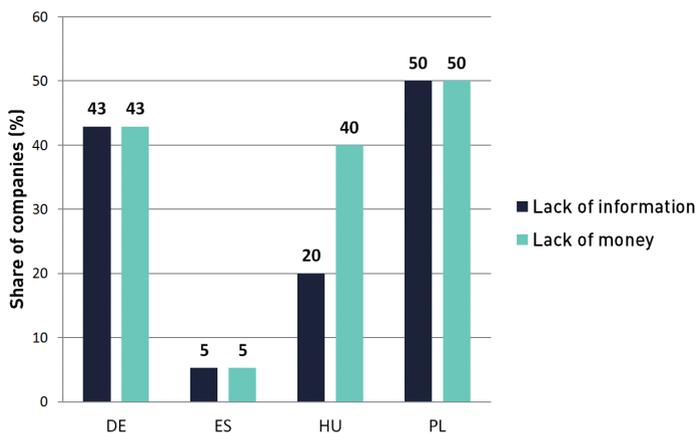
Source: own compilation

Both in theory and practice, collaboration is clearly advantageous with companies gaining a lot more out of it than just raised profit. Our survey was able to prove this claim; however there are a number of companies not practicing collaboration enough. What could be the reasons behind this? What happens with those firms that do not collaborate? The results of our survey provide some potential answers. Almost one-third of respondent companies indicated they lack the information and money for collaboration. Apart from these main hindering factors, there are several other reasons why companies do not enter into collaboration with each other or with other types of institutions of the innovation chain. Various excuses appear among the responses such as lack of time, lack of trust, or distrust towards other actors, as well as legal problems (e.g. not clarified intellectual property rights).

Taking into account the cultural differences of the German, Spanish, Polish and Hungarian business environment, it is not surprising that there are significant differences between the examined regions (Figure 5). It seems that lack of money is a general problem in all regions, but lack of information regarding the advantages of collaboration was also perceived as a major problem with half of the respondent companies in Germany and in Poland. This could mean

that they would either require more information about collaboration opportunities or that the amount, even the format of the provided information does not fulfil their needs. It seems that in Navarra region respondent companies are happy with both the information provided and the funding available to support those collaborations. In Western Transdanubia, companies mentioned distrust as the second major hindering factor for collaboration with lack of money taking first place.

**Figure 5: Reasons for not using external intellectual resources**



Forrás: kérdőívek, saját szerkesztés

**Well-trained employees are prerequisites for company R&D activities.** Density and intensity of information flow among innovation actors defines the level of collaboration. According to our survey, collaboration is primarily based on personal relationships that are formal or informal company-company contacts. As companies seek well qualified employees with the latest technological knowledge, higher education institutions could also play an important role in the innovation process by offering courses for company employees to upgrade their knowledge and develop new partnerships. According to the survey, the majority (82%) of respondents have some kind of contacts with higher education institutions. In this field the Stuttgart region has the best record as each respondent company is linked to universities in some way. According to their estimation, companies do not fully exploit this potential, since intensity of collaboration with higher education institutions in the field of R&D is ordi-

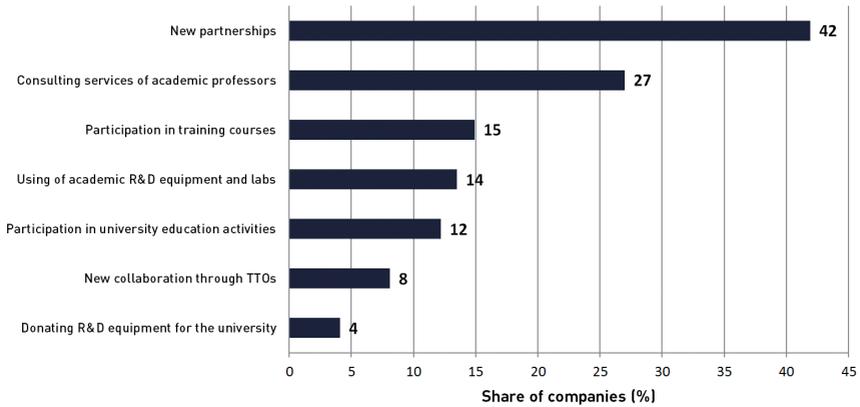
nary. The closest contacts between firms and universities could be observed in Germany, the weakest in Poland.

**Means of collaboration between companies and universities.** Assuming that collaboration between companies and higher education institutions is beneficial for both parties, it is surprising that this potential is not fully exploited. Why do companies and universities not collaborate more? What could be the underlying reasons? Are companies aware of knowledge encapsulated in university departments? How could they access it? Do they receive regular information from universities? How useful is this information?

## Why do companies and universities not collaborate more?

According to our survey, the majority of companies (42%) were able to develop new partnerships through university-industry collaboration. Apart from this joint activity, consulting services of professors were the most frequently used among the respondent firms (27%). Participation in training courses organized by universities seems a less significant type of collaboration for companies. A significant share (14%) of the companies used some R&D equipment and labs of a higher education institute. A similar proportion (12%) participated in university education activities as a lecturer, provided some equipment, or offered company trainee possibilities for students. Apart from the above-mentioned major collaboration forms, 8% of companies established new collaboration through the technology transfer offices (TTOs) of universities. Some firms in the sample also mentioned that they donated R&D equipment to higher education institutions (Figure 6).

**Figure 6: Results of information provided by universities**



Source: own compilation

It should be mentioned that development of new partnerships is the main result of university-industry collaboration in Navarra (45%) as well as in the Stuttgart region (40%). Consulting services are the most popular in Western Transdanubia (56%) and in the Lodz region (40%). 40% of the German companies use academic R&D equipment and labs while one-third of Hungarian respondent companies participate in university education activities. It seems that intermediaries can play an important role in bringing together academia and business, because in Stuttgart region, in Western Transdanubia and in the Lodz region about one-fifth of the respondents were able to develop new collaborations through TTOs.

## 5. Conclusions: towards an open innovation model

The interregional survey carried out in four different regions of the European Union revealed that it is worth exploring new pathways of university-industry collaboration. Traditional forms of collaboration work well among those partners who already know each other and are open to collaboration. Much more has to be done to support those companies and university departments that have potential and possess relevant competences as well as the ability to change but are for some reason unable to connect. Indeed, change is needed for both

universities and companies to behave and act more openly and proactively, instead of merely complaining about the hindering factors of collaboration. This certainly does not only mean changing attitudes or management style. New activities should be developed and practiced that systematically build up trust among actors. Companies in the 21st century have identified that continuous development and innovation is needed to survive in a highly competitive global economy. Both companies and knowledge institutions such as universities are pressed to find novel and better solutions as the world order calls for “cheaper, better and faster” production and delivery of products and services. Closed innovation belongs to the past, companies should open up their research and development to involve more external ideas and partners as well as externally exploiting those technologies the company has no immediate use for.

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It should be pointed out that higher education institutions could play a more active role in initiate collaboration than they have so far. Certainly, it is in their interest to become more active and do more marketing. For instance, universities could present and promote their competences, references and equipment in various format and events. Many surveys have echoed ours in pointing out that there is not enough interaction among the actors and that their communication is often insufficient in terms of the format and amount. The players don't understand what the other wants, because academics and business people speak a different language. To put it simply more communication is needed from both parties.

The good news is that there is a solution. It is about a process of becoming open. The first step is to understand the drivers. The second step is to slowly open the search for partners, the management process and finally the outcomes (Alexander et al. 2012). Based on the results of our survey, it is recommended for higher education institutions to promote more intensively their research and development competences as well as their laboratory capaci-

ties and equipment. This awareness raising and information provision both in electronic and published format creates some potential that can be developed further. According to our survey, the most effective way of communication with companies could be implemented via newsletters sent by e-mails or by regularly updated homepages. In addition, annual reports and research reports could be sent to companies that are potentially interested in some development and innovation activities. Besides this, delivering classes at universities or workshops and trainings at companies build up some essential trust between potential collaboration partners as they get to know each other step by step. Joint and collaborative research and development is one of the most sensitive and confidential activities two organizations could engage in. Therefore, it is recommended to go through the previously mentioned easier and less sensitive forms of collaboration before entering joint R&D projects. Taking this into account fruitful collaboration and high impact results could follow.

Key factors for successful open innovation are well managed partners and networks.

Similarly to the conclusions of Vanhaverbeke [2012], the results of our survey show that strategies, which are related to a high innovation success, require appropriate competences in managing innovation both in companies and universities. Many barriers for open innovation are related to management and culture which emerge when companies and universities start to interact and collaborate with each other. Key factors for successful open innovation are well managed partners and networks.

Finally, we provide some suggestions for organizations – companies being small or large, and higher education institutions being highly research-intensive universities or rural colleges – to manage its relationships successfully with external partners (Vanhaverbeke 2012, 75-76):

- Select the right partners carefully.
- Establish clear leadership that is needed to organize and manage the innovation network.
- Activate and continuously take care of your innovation networks.
- Communicate and report openly among your innovation partners.

- Manage the balance between internal management of the company and external management of the network.
- Choose partners of similar size and ambitions to help improve collaborative innovation.
- Control your costs.
- Pay attention to “Knowing who knows what”. It can become a major asset.
- Manage tensions and problems in the network proactively.

There are certainly other recipes for success as well. We recommend, however, looking for them only after trying out the above mentioned suggestions. Nothing is better than action: “**Just do it!**” And we wish you good luck!

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