IMPROVING COOPERATION BETWEEN UNIVERSITIES AND INDUSTRY

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Abstract

Improving cooperation between universities and industries is a process that can always be with a positive trend. Unfortunately, the reality is that it happens less and less in Serbia. There are several reasons why the cooperation between the universities and the industries is not on higher level. In this paper, the focus will be on the rules for the promotion of professors at universities in Serbia. These rules discourage cooperation with industries. Besides, there are other very important reasons, such as lack of stimulation of the cooperation with industry through research projects funded by the Ministry of education, science and technological development of Serbia, bad image of professors as scientists, if they have cooperation with industries, legal regulations, lack of laboratories and space. In this paper the possibilities are analysed which can be used for improving cooperation between universities and industries.

Keywords: university; industry; projects; regulations.

1 Introduction

The main purpose of the university is transferring knowledge to the students. After the completion of university studies, students should received and accepted knowledge which can be validate in the industry. The success of the educational process is measured by level valuating student's knowledge in the industry.

Still, questions remain as how well university prepare graduates to meet the challenges, in constantly evolving and demanding work environments (Hills, Robertson, Walker, Adey, & Nixon, 2003; Rubin & Dierdorff, 2009). Some authors suggest that undergraduate education is failing to adequately prepare graduates for today's work-places because of degree of mismatch between skills acquired in higher education versus those required for employment. (Cranmer, 2006; De La Harpe, Mason, Williams & Cranmer, 2009; Radloff, &Wyber, 2000; Jackson, 2009; Washer, 2007; Wilton, 2008). This results in reduction of graduate employability because employers continue to be concerned about new graduates' ability to meet current and future work requirements (McQuaid & Lindsay, 2005; Jackson, 2009).

Adoption of knowledge is a relatively lengthy process. Formally, it starts in elementary school and ends in doctoral studies. The changes that are being introduced into the system, they have a long-term response. If one takes into account the first professional oriented courses, in the case of university education, are taken after the third year, and most students finish master's degree, it means that it will certainly take at least several years until a former student have the opportunity to apply gained knowledge in a industry environment (under this environment will be considered all types of manufacturing and service systems).

Several years are a long time in many professions (such as computer science, mechatronics, electronics, telecommunications, etc.) since there is a significant change and rapid "obsolescence" of knowledge. This primarily refers to a variety of software tools and hardware configurations. One way to avoid such cases is teachers to actively participate in various industry projects and thus follow the trends that are occurring in the business environment and in time make the necessary changes in the content of their courses.

Universities and industry organizations have traditionally maintained informal ways of working together (Mead, Beckman, Lawrence, O Mary, Parish, Unpingco, & Walker 1999), including: faculty exchanges, student internships, and industry projects to complete an undergraduate or master degree program. This collaboration also results in inter-organizational knowledge transfer which has become a critical resource for the survival and growth of high technology industry (Malik, 2013). Based on all previously mentioned it can be concluded that it is necessary to establish cooperation between university and industry not only to educate students according to the needs of industry but also for the further development of the industry.

Core business of the university staff is knowledge transfer, but it is not limited to only this. It was often the case that not enough attention is paid to other jobs that are crucial to the quality of university staff work which are research

and collaboration with industry. Therefore, the state often, with its laws, prescribes the conditions that academics must meet in all three areas: education, science/research and collaboration with industry (The Law on Higher Education, 2005) in order to gain as better structure of university educated population (Statistical Almanac of Serbia, 2012). Despite the fact that the state has well-prescribed criteria for all three segments, in practice different interpretations happens. In following sections, it will be explained that in the case of the rules for university professors from the University of Novi Sad, one can be promoted to a higher position even though he or she has not realized any kind of cooperation with industry.

2 Current situation for grant tenure in Serbia

The basic document which defines selection criteria for direct recruitment of assistant professor; associate professor; and professor of the university is the Law on Higher Education (The Law on Higher Education, 2005). On the basis of this law, University of Novi Sad is adopted the minimum requirements in several categories to become a professor. All requirements are defined in Rulebook on closer criteria for identification requirements to become a professor at University of Novi Sad (http://www.uns.ac.rs, 2013). The rulebook also defines scientific disciplines in which a candidate can apply for professor position at the university. These disciplines are: Natural sciences, Medical sciences, Engineering Sciences, Social Sciences & Humanities, and Arts. The area of interest for this paper is Engineering sciences.

In Rulebook (http://www.uns.ac.rs, 2013), cooperation with industry, as the criteria, are mentioned in the promotion to associate professor. Table 1 shows the criteria as defined in the law and in the rulebook for discipline Engineering sciences.

Table 1: Criteria as defined in the law and in the rulebook for discipline Engineering sciences (The Law on Higher Education, 2005)

	Law on Higher Education	**Rulebook on closer criteria for identification requirements to become a professor at Univeristy of Novi Sad**
Associate professor	Original professional project in industry, a study, a patent, an original method, the new sorts, etc.., or conducting either participating in research projects.	Original professional project in industry, a study, a patent, an original method, the new sorts, etc.., or conducting either participating in research projects.
Professor	Published a textbook, a monograph or original professional project in industry.	Published a textbook, or monograph either original professional project in industry.

On the other hand there is a National council for higher education, an independent body established to enable that the law be fully implemented at universities. It is highest ranked body in system of education and sciences in Serbia (http://nsvo.etf.rs/, 2007). Also, the National council for higher education adopted the strategy of education and science. The National council for higher education is interpreted the same criteria as shown in Table 2.

Table 2: Criteria as defined in the law and in the National council for higher education (http://nsvo.etf.rs/, 2007).

	Law on Higher Education	**National council for higher education**
Associate professor	Original professional project in industry, a study, a patent, an original method, the new sorts, etc.., or conducting either participating in research projects.	Original professional project in industry and participation in research projects.
Professor	Published a textbook, a monograph or original professional project in industry.	Original professional project in industry and participation in international/domestic research projects.

In addition to the criteria given in Table 2, the National Council for higher education has defined a mandatory condition for promotion of university professors and a category: contribution to the academic and wider community. Within this category requirements that also encourage cooperation between the universities and the industry are defined. These requirements are as follows:

- Reputation based on call to participate in public professional conferences;
- Participation in committees, legislatures, etc., in accordance with the scientific / artistic and professional expertise;
- Consultancy services to the community;
- Conduct or participate in activities that contribute to the reputation and status of colleges and universities;
- Participation in relevant professional bodies and community organizations;
- Creative activities that demonstrate professional achievement and contribution to the improvement of the university as a learning community.

The above requirements are easy to fulfil when a professor has cooperation with industry. However, the National council for higher education did not determine these requirements as mandatory. Instead, the National Council for higher education has allowed meeting the requirements of the category: Contribution to the academic and wider community, by participation of the professor in a scientific/research project.

The situation is similar with the requirements in the Rulebook of the University of Novi Sad. Table 1 show that a candidate for associate professor, instead of having the original professional project in industry, can substitute it with participating in a research project. In the case of promotion to full professor, instead of having the original professional project in industry, can substitute it with be published textbook. This clearly suggests that someone can be promoted to the highest university position without any cooperation with industry.

The question is: How is it can be allowed to promote university professor to the highest position at the university without having the opportunity to confirm and evaluate his/hers knowledge in the industry? The answer to this question is not simple and it can be viewed through the following several aspects:

- Heritage of the socialist system;
- Forcing scientific publications as a key element for determining the quality of skills of university professors;
- Funding of research projects without the active participation of the industry (in the last call for research grants from the Ministry of Education, Science and Technology nearly 90% of applied projects has get grants! None of the projects of technological development had, as mandatory condition, cooperation with the industry!);
- Difficult financial situation in the industry;
- Lack of quality space for long term cooperation with industry;
- Unwillingness / inability of university professors to have cooperation with the industry.

Surely other aspects can be added. Among them, certainly should extricate regulation that applies to the purchase of goods and services through public procurement. Public procurement is determined only once a year and it should be much more frequent. In the meantime, if someone has a new project with the industry, it is not allowed to get requests for new purchases. This regulation makes cooperation with the industry much more difficult. Time, as a key factor in almost all activities, in the public procurement system is ignored totally. Because of that, the industry does not have any particular interest to cooperate with the university, since the response is too slow and complicated. The same conclusion can also be drawn for university professors.

Despite all these difficulties, professors should never forget that the knowledge, they are transferring to students, is primarily intended for apply in the industry and commercial activities. Professors have to be sure that their knowledge is applicable in the industry. The best evaluation of this knowledge can be done through collaboration with the industry. Most of renowned universities oblige their professors to implement learning method based on solving the real problems that exist in the industry. Within these methods, professors have to show students how and where to apply theoretical knowledge acquired at the university. Using these methods, all participants have benefit:

- The industry, because it quickly recognizes the best students;
- Students, because they gain practical knowledge and they are ready after graduation to immediately begin working in the industry;
- Professors, because they quickly get feedback on the quality of their work, which can be very helpful in modifying / supplement / improve courses.

A similar approach could be applied to the University of Novi Sad. Simple changes of criteria for promotion to professor would certainly increase cooperation with the industry. Also, this will help to convergement with U-Multirank requirements.

3 Convergement with U- Multirank requirements

On 2 June 2009 the European Commission announced the launching of a feasibility study to develop a multi-dimensional global university ranking. The Commission believes that accessible, transparent and comparable information would make it easier for students and teaching staff, but also parents and other stakeholders, to make informed choices between different higher education institutions and their programmes. It would also help institutions to better position themselves and improve their quality and performance (Vught & Ziegele 2011). The Commission pointed out that the new ranking system should be:

- multi-dimensional: covering the various missions of institutions, such as education, research, innovation, internationalization, and community outreach;
- transparent: it should provide users with a clear understanding of all the factors used to measure performance and offer them the possibility to consult the ranking according to their needs;
- global: covering institutions inside and outside Europe (in particular those in the US, Asia and Australia).

Transparency is of major importance for higher education and research worldwide which is increasingly expected to make a crucial contribution to the innovation and growth strategies of nations around the globe. Obtaining valid information on higher education within and across national borders is critical in this regard, yet higher education and research systems are becoming more complex and – at first sight – less intelligible for many stakeholders. The more complex higher education systems become, the more sophisticated our transparency tools need to be.

Existing international transparency tend to focus on a single dimension of university performance – research. The new tool U-Multirank will promote the development of diverse institutional profiles (Vught & Ziegele 2011).

On the basis of an extensive stakeholder consultation process (focusing on relevance) and a thorough methodological analysis (focusing on validity, reliability and feasibility), U-Multirank includes a range of indicators that will enable users to compare the performance of institutions across five dimensions of higher education and research activities:

- Teaching and learning;
- Research;
- Knowledge transfer;
- International orientation;
- Regional engagement.

On the basis of data gathered on these indicators across the five performance dimensions, U-Multirank could provide its users with the on-line functionality to create two general types of rankings:

- Focused institutional rankings: rankings on the indicators of the five performance dimensions at the level of institutions as a whole
- Field-based rankings: rankings on the indicators of the five performance dimensions in a specific field in which institutions are active.

In most disciplines publications are often seen as the single most important research output of higher education institutions, research performance measurement frequently takes place through bibliometric data. Data on publications, texts and citations is readily available for building bibliometric indicators (see Table 3). This is much less the case for data on research awards and data underlying impact indicators.

The Expert Group on Assessment of University Based Research, 2010, defines research output as referring to individual journal articles, conference publications, book chapters, artistic performances, films, etc. While journals are the primary publication channel for almost all disciplines, their importance differs across disciplines. In some fields, books (monographs) play a major role, while book chapters or conference proceedings have a higher status in other fields (see Table 3). Therefore, focusing only on journal articles may not do justice to the research performance in particular disciplines.

Table 3: Primary form of written communications by discipline group (Expert Group on Assessment of University Based Research, 2010)

	Natural sciences	Life sciences	Engineering Sciences	Social sciences & Humanities	Arts
Journal article	X	X	X	X	X
Conference proceedings			X		
Book chapters				X	
Monographs/Books				X	
Artefacts					X
Prototypes			X		

The Expert Group on Assessment of University Based Research, 2010, suggested that the written communications for the Engineering sciences should be in a form of (Table 3.): journal articles, conference proceedings and prototypes (knowledge transfer which includes also: number of spin-offs, third party funding and patents).

Key dimension that should improve cooperation between universities and the industry is knowledge transfer, especially in discipline of Engineering sciences. University professors will be interested in cooperation with the industry if they can achieve multiple benefits. This means that professors who have cooperation with the industry, at the same time increase the reputation of the university and satisfy the requirements for promotion to the higher position of university professor. In weak economies, such as in Serbia, this cooperation has added value.

4 Conclusion

Each university professor should have in mind that the primary purpose of education is knowledge transfer to students. Gained knowledge students can use to solve practical problems in the industry. Therefore, it is necessary to establish a permanent cooperation between university and industry, since the professors will, in that way gain practical experiences when dealing with problems in industry and then transfer that knowledge to students.

There are many reasons that discourage cooperation between university and industry like: lack of stimulation of the cooperation with industry through research projects funded by the Ministry of education, science and technological development of Serbia, bad image of professors as scientists, if they have cooperation with industries, legal regulations, lack of laboratories and space. Because of mentioned reasons, very often university professors ignore cooperation with the industry, the state with the low or the universities with the Rulebook define requirements that encourage this kind of collaboration. Unfortunately, in practice happens that instead of cooperation with the industry, it is possible to offer some other results. Because of such approach, cooperation between university and industry has been steadily decreasing in recent years. This trend is certainly not good and it can have a negative impact not only for both sides: the university and the industry, but also for wider community.

In order to promote cooperation between universities and the industry, professors have to be stimulated to participate in it. This can be done in several ways, such as: primarily through the requirements for promotion to higher positions and requirements through the funding of research projects with participation of the industry. Also, stimulation can be done by reducing the proportion of funds allocated to the Faculty of the total project value. In a weak economy, like Serbian, this approach has special importance, because it enables rapid transfer of the latest knowledge from universities to the industry.

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