

University – Industry Cooperation

in the context of Ruse University, Bulgaria

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Abstract—The article considers different forms of the university-industry cooperation. A model of university – industry cooperation is presented. Forms of the cooperation and the responsible centers at Ruse University are described. An example of Telecommunications Department and TERACOM Company interaction is given.

Keywords-university; industry; cooperation; R&D; intellectual property; entrepreneurship

I. INTRODUCTION

Modernisation of Europe’s universities, involving their interlinked roles of education, research and innovation, has been acknowledged not only as a core condition for the success of the broader Lisbon Strategy, but as part of the wider move towards an increasingly global and knowledge-based economy. Many European universities still underestimate the potential benefits of sharing knowledge with the economy and society, while industry has not developed sufficient absorption capacity to use the potential of university research. Consequently, the interaction with the business community and with wider society remains difficult [1].

Universities have the potential to play a vital role in the Lisbon objective to equip Europe with the skills and competences necessary to succeed in a globalised, knowledge-based economy. In order to overcome persistent mismatches between graduate qualifications and the needs of the labor market, university programs should be structured to enhance directly the employability of graduates and to offer broad support to the workforce more generally. Universities should offer innovative curricula, teaching methods and training/retraining programs which include broader employment-related skills along with the more discipline specific skills. Credit-bearing internships in industry should be integrated into the curricula. This applies to all levels of education: Bachelor, Master and Doctorate. It also entails offering non-degree courses for adults, e.g. retraining and bridging courses for employees. This should extend beyond the needs of the labor market to the stimulation of an entrepreneurial mindset amongst students and researchers.

Sustained competitiveness of the global economy depends on technological or innovation-based strengths, such as the ability to apply new technology, to develop new products, to access new market successfully, to incorporate best practice in

the management of enterprises and to develop skill levels across the full spectrum of the labor force.

The need for new scientific knowledge has resulted in an increasing focus on the links between industry and academic institutions. These links may lead to considerable diffusion of scientific and technical knowledge, particularly into the SMEs. There is a growing awareness of the important role that the university sector can undertake, especially at a regional level.

The Bulgarian Ministry of Education, Youth and Science works intensively towards building a modern educational system in accordance with the needs of business and society. Specific steps have been taken towards building stable links between business, employers and the qualification of graduates. At the initiative of the staff of “National Teams of Bologna Promoters” and the Council of Rectors the attention of the society has been focused on the regional dimensions and significance of university in the development of local economies and the stabilization of regions. Another example of a stable partnership between universities and business is the creation of Centers for Career Development at higher education institutions. A special training of their staff has been ensured in accordance with the Global Career Development Facilitator Program. The centers not only facilitate the professional orientation of the graduates, but also serve as a bridge between universities and employers in order to meet the social needs. By 2008 such Centers for Career Development were functioning at 35 out of 51 higher education institutions [2].

II. FORMS OF UNIVERSITY – INDUSTRY COOPERATION

A. Main points of the cooperation

Since the eighties, many countries have implemented policies to facilitate the transfer of knowledge from universities to companies: establishment of legal frameworks, creation of technology transfer offices inside universities, increasing the mobility of researchers to industry, large cooperative R&D programmes, etc. Some analyses show that these policy measures have contributed greatly to increasing the number and the scope of links between the two worlds [3].

B. A model of the cooperation

The relationship between university and industry is a complex and heterogeneous phenomenon (Figure 1). The intensity of links varies across firms, sectors and countries.

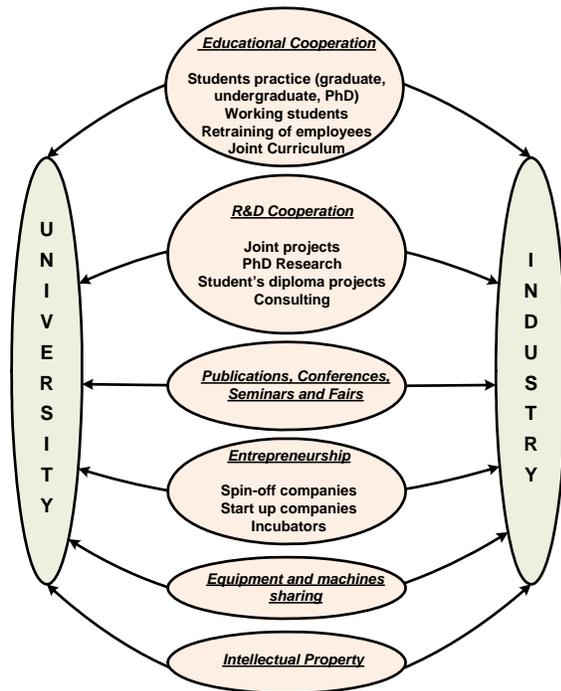


Figure 1. The model of forms of University – Industry Relationships

- Educational Cooperation

Industry and university can transfer knowledge by cooperating in education. Since education is one of the core businesses of the academe, it can also be used to educate employees of the industry. For the students from the three educational levels (bachelor, master and doctoral) it is crucial to obtain real word experience by taking part in internships or industrial placements.

Another way of cooperation is the influence industry exerts on the curriculum. By doing this they can help the university to stay in touch with (local) economy and provide themselves with a well-educated labor market. Student learning is enriched and prepares them for future employment as they gain exposure to live problems and solutions through the curriculum and placements [4]. Joint curriculum is high level of cooperation between the universities and industry. The students can obtain deep theoretical knowledge at the university and specialised practical skills in the company in a single degree course. Good practice are the exchange programmes addressing personnel needs of SMEs, joint graduates education programmes that include enterprises in the defining of theses' themes and enable students to carry out practical R&D work in firms.

A frequently used form of collaboration includes inviting experts from industry as “guest” lecturers and teaching assignments in industry by university teachers.

- R&D Cooperation

From the firms' point of view, the relative importance of R&D cooperation with universities is as an external source of information for new ideas and access to highly educated people

and young talent. In the short term, universities are only occasionally successful and helping industry solve its immediate problems. In the long term, the new ideas and understandings will result in the creation of new technologies as well as continuous improvements in the already existing technologies [5].

The forms of interaction vary greatly: from ad hoc consultation to joint research activity. The most valuable R&D cooperation is joint projects. An R&D-project can also be embedded in humans, for example a Ph.D. student [6]. This Ph.D. student can attract more forms of interaction, for example graduate students working on the same subject.

- Publications, Conferences, Seminars and Fairs

Both, Universities and Companies use these channels (publications, informal contacts, conferences, recruitment of students, formal collaborative contracts, etc.) to exchange knowledge. Conferences and workshops give opportunities to academic researchers and companies to create networks of people within a certain field of science. Social networks that come from the education system, for example alumni societies have a strong influence on university – industry relationships. First contact between universities and industry often originates from personal networks.

- Entrepreneurship

Professors, researchers and students in Europe have a poorly developed entrepreneurial mindset that results in few spinouts and new businesses. The challenge for higher education is to provide learning environments that stimulate independence, creativity and an entrepreneurial approach to harnessing knowledge [4]. Research-based start-ups from public science have become a key concern for universities and public laboratories. Larger firms and start-ups have a higher probability of benefiting from academic research. Universities often own equities in the spin-offs that use their knowledge.

The integration of entrepreneurship into the curricula (that is, professorships, special courses and so on) is another promising approach [7].

- Equipment and machines sharing

The sharing of equipment and facilities can be induced by different rationales. The costs would be higher if the university and industry both bought machines or other facility. In the same way problems of a minimal efficient size of a facility could lead to the same outcome. However, the sharing of facilities can also be a result of the need to test innovations [6].

- Intellectual property

The protection of intellectual assets is essential to the competitiveness of most organisations, private or public, and to their attractiveness to investors [8]. Special emphasis needs to be placed on specific issues relevant for R&D collaboration and technology transfer between public research organisations and industry, since “university – industry relations” are an increasingly important way of enhancing the impact of scientific achievements on European competitiveness. Action is needed to promote the optimal use of intellectual property

rights systems in Europe, eg. activities with a special emphasis on academic institutions and small businesses.

Another important issue is measuring the successfulness of the university-industry relations and finding out qualitative and quantitative indicators to represent these relations [9].

III. RUSE UNIVERSITY – INDUSTRY COOPERATION

In Bulgaria, various pilot programmes to support partnerships between universities and small and medium-sized firms are part of the higher education action plan which is under way until 2010 [10].

At Ruse University there are several forms of university – industry relations.

- Educational cooperation

In the curriculum of the Bachelor degree course in “Telecommunication systems” a specialized practice is included. The aim of this practice course is to help students assimilate the acquired theoretical knowledge and practical skills and to obtain new specific knowledge and skills under the conditions of real businesses and organizations engaged in design, introducing, exploitation and maintenance of communication-information systems. The students gain academic credits for the course. The practical experience is organized to fit in the course schedule. It is conducted in enterprises, companies, organizations with modern manufacturing facilities or in organizations where contracts for practical training are concluded. The practice can be carried out in an enterprise suggested by the student but under the condition that it is properly equipped to enable the implementation of the practice objectives and tasks (tutor’s permission needed).

Career Development Center (CDC) at Ruse University was established in 2005 [11]. The CDC is organized according to the model of career management centers, which function in Western Europe and the US. The CDC is the centralized, comprehensive career services center where undergraduates, graduate students and alumni of the University are first in the focus and commitment. The primary purpose of the CDC is to assist and guide students and alumni in their career quest. The CDC attracts employers as partners by initiating and facilitating opportunities in the public, private, governmental, and corporate sectors. The CDC organizes several major career fairs; provides on campus recruiting events, workshops, programs, and opportunities for students that facilitate career exploration and professional development. One of the CDC services is finding and organizing internships and placements in industry.

- R&D Cooperation

The Research and Development Sector (R&DS) of "Angel Kanchev" University of Ruse was founded in 1965. According to the regulations concerning the work of the University the main task of the R&DS is to organize the research and production work, create student internships [12]. The organizational structure and activities of R&DS are regulated by rules, approved by the Academic Council of the University. The whole work of the R&DS is self-financed under full

financial and personnel independence. At present R&DS is the main unit for business contacts of the University with state and private organizations and firms. Within the framework of R&DS, groups of highly qualified lecturers, doctoral students, students and technicians perform, on a contractual basis, fundamental scientific research, as well as development, implementation and consulting activities.

Under the PHARE 2005 Programme “Establishment of Technology Transfer Offices at Bulgarian Public Research organizations Grant Scheme” a Technology Transfer Office (TTO) was established at Ruse University. TTO mission is to be a facilitator for the technology transfer process between the adopters of technology and the providers of technology in order to contribute towards closing the gap between the Bulgarian private enterprises in Ruse, Nord Central Region and Bulgaria as a whole and Ruse University researchers [13]. TTO matches the technological needs of enterprises with innovation and research outputs that are ready for commercialisation, for the benefit of the society, while seeking income for the university and the inventor/creator, as well as enhancing industrial liaison and supporting regional economic development. TTO also supports the development of knowledge transfer capacities and skills among students.

- Publications, Conferences, Seminars and Fairs

Ruse University has several annual conferences and fairs in the field of: Electrical engineering, Computer Systems and Technologies, Energy Efficiency and Agricultural Engineering, Entrepreneurship and Innovation. Proceedings of every conference are published. The results of the cooperation in Entrepreneurship and Innovation are published in the journal of the same name [14]. Student scientific conference and workshop are organized every year.

- Entrepreneurship

The Entrepreneurship Center at Ruse University [15] was established in 2008 in respond to an initiative of Bulgarian Ministry of Economics and Energy. The aim of the Center is to facilitate the students and academics at Ruse University, who look for opportunities to start new ventures or to develop their existing small businesses. The Center offers basic services in support of entrepreneurs and education in Entrepreneurship at Ruse University. In respond to the specific needs of each entrepreneur the Center attracts as mentors managers of micro, small and medium enterprises, finance and accounting experts, consultants in programs and projects in SME support. The academic mentors are mainly among the lecturers who teach the Master degree course on Entrepreneurial Management. They are managers of firms or business consultants.

- Intellectual property

The activities of the existing at Ruse University Center for Intellectual Property are: education and consultations for physical and juridical persons from the business, non-profit organizations and the academic community; intellectual property educational courses for teachers, researchers and students are regularly organised; consultations for students developing their PhD thesis in intellectual property; providing information and consultations for any interested party with

regard to intellectual property protection in the Republic of Bulgaria and abroad.

Some centers at Ruse University are responsible for the cooperation (Figure 2).

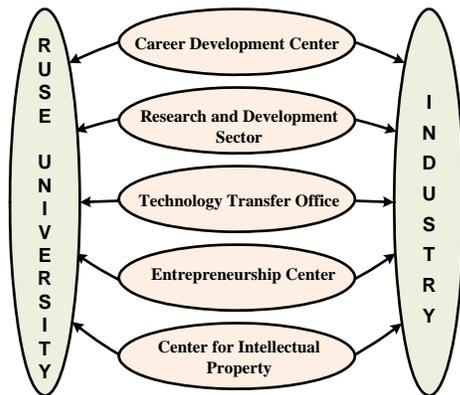


Figure 2. Ruse University – Industry Cooperation Centers

IV. TELECOMMUNICATIONS DEPARTMENT – TERACOM COMPANY COOPERATION

Telecommunications Department at Ruse University and TERACOM Company have had fruitful cooperation for many years. TERACOM is a Bulgarian company specialized in the areas of telecommunications and electronics [16]. The links between the two partners are an example of good practice for university – industry cooperation. There is a formal contract for collaboration between the Department and the Company.

Educational cooperation includes: student internship and placements; student jobs; providing student scholarships; supervision of bachelor and master students; reviewing of diploma thesis; PhD research work support; courses for employees; joint seminars, workshops, round tables; participation in the advisory board of the Department for curricula and syllabus development; participation in commission for student diploma thesis defense, etc. The Company donated equipment for a laboratory on “Telecommunications” and sponsored the educational process by specialized electronic boards.

R&D Cooperation includes: joint participation in national and international projects as “An applied research project for the design of a pay-off system based on a digital coding system DVB - CA” and “Enhancing Lifelong Learning for the Electrical and Information Engineering Community – Erasmus Network Project”; involvement of students in these projects; joint scientific publications; sharing of machines and laboratory equipment.

V. CONCLUSIONS

European universities have enormous potential, but this potential is not fully harnessed and put to work effectively to underpin Europe’s drive for further growth and job creation.

The cooperation benefits for the universities are generally:

funding for research; opportunities for graduates; directions for research. The benefits for industry are mainly based on earlier and easier access to university graduates and faculty members; research results; intellectual property rights. All these features reflect that the university – industry interaction provides the innovation system with much more dynamism and efficiency compared to each partner working separately.

However, despite this positive picture there are problems among these participants in not only sharing the results of this cooperation, but also in creating a platform for collaboration. These problems generally emerge due to the differences in contributions and expectations.

From the institutions’ point of view at Ruse University most of the structure units necessary for supporting the university–industry cooperation have already been created. Despite of this fact the real interaction is quite difficult mainly due to financial complications.

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