

Triple Helix Model and Partnerships of Technical Faculties of Universities

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Abstract: This paper is dedicated to the problems of the triple helix model and partnerships of technical faculties of universities in relation to the role of partnerships in a knowledge-based society. The paper aims to identify alternative forms of university partnerships in the context of the triple helix model (on the university-industry level) and to document the situation on selected examples of good practice from the point of view of technical faculties of universities in the Czech Republic. At first, it clarifies the essence of the triple helix model and lists the possible forms of university-enterprise partnerships implemented within this model. After that, the attention is focussed on the examples of good practice from the point of view of technical faculties of universities.

Key-Words: partnership, university-industry partnership, triple helix model, innovation, university, enterprise, government

1 Introduction

Universities currently represent the key national economy entities in each country. They are top centres of scholarship, which play a fundamental role both in economic and scientific and in social and cultural development of the society. Thanks to the development of independent knowledge and creative activities, they form the human potential, their research and development activities lead to development of know-how, and last but not least their active role in the public discussion contributes to mutual understanding in the society, to development of ethical principles or cultural diversity.

In consequence of the above positive effects of universities, it is necessary to develop knowledge in this area, focussed e.g. on the potential forms of partnerships between universities and other national economy entities, especially enterprises. And such partnerships can be based on the triple helix model, expressing cooperation of universities, enterprises and governments in the context of innovations and their role in the current knowledge-based society.

The fact is that the rate of cooperation of universities with their surroundings is determined by a number of factors. Differences can be found both between individual countries and between individual universities or faculties. From the point of view of their contribution to the economic growth

and development of the society, technical faculties of universities, which can become an example of good practice for the others, have an important status.

The paper aims to identify alternative forms of university partnerships in the context of the triple helix model (on the university-industry level) and to document the situation on selected examples of good practice from the point of view of technical faculties of universities in the Czech Republic.

The authors of the paper used the following research methods: interpretative-theoretical research, descriptive research, correlation research and structured interviews.

2 Triple Helix Model and University Partnerships

The triple helix model, also called the triple helix model of innovation [22], or in short just the triple helix, can be defined variously.

According to Chu et al. [2], the triple helix is "a model for transformation processes that involve relationship between government, industry and university".

According to Etzkowitz [22], the triple helix is "a model for capitalizing knowledge in order to pursue innovation". It is "a spiral model of innovation that captures multiple reciprocal relationships at

different points in the process of knowledge capitalization". [5]

Saad & Zawdie [9] note that the triple helix is "a strategy for innovation and sustainable development"; it is "about the dynamics arising from the interactions between the three principal institutional spheres in an economy - namely, the university, industry and government - and the leading role the university assumes in the relationship to ensure that the knowledge it produces is useful enough to be widely shared and applied, ultimately translating into regional and, indeed, national development".

In this context, Leydesdorff [7] mentions that "university-industry-government relations provide a networked infrastructure for knowledge-based innovation systems".

The above mentioned implies that the triple helix model expresses cooperation of the industry (enterprises), universities (public and private) and the government (on the national, regional or municipal level) that leads to creation, transfer and application of knowledge, see Figure 1 for more details.

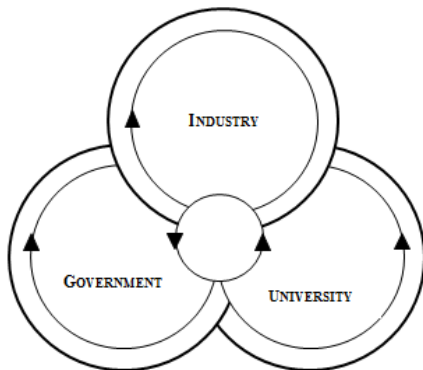


Figure 1 - Triple Helix Model

Source: Modified according to [4, 12].

Partnerships within the triple helix model can be implemented both within individual spiral elements, and between its two or among all three elements; see more [13].

If we pay attention to cooperation between universities and the industry, which is essential from the point of view of know-how transfer, we can identify a number of possible forms of cooperation and partnerships; see more e.g. [1, 3, 4, 6, 11, 24]. To get a better overview, we can classify them into groups from the point of view of their relation to the basic areas of university activities. We can then distinguish the following groups and forms of cooperation:

1. cooperation in the area of science and research:

- * establishment of venture capital firms and spin-off companies;
 - * establishment of joint workplaces;
 - * establishment and participation in scientific parks (centres), technological parks (centres), and innovative centres (nets);
 - * membership in clusters and professional associations;
 - * project solution according to an external entity's assignment;
 - * mutual participation in university or company projects, also with financial support from the public sources, e.g. the EU funds;
 - * organization of professional conferences;
 - * mutual preparation of expert's opinions;
 - * professional counselling.
2. cooperation in the area of education:
- * establishment of corporate universities;
 - * offering lifelong employee education programs, both in the form of a regular university course, and in the form of seminars focussing on selected problem areas;
 - * participation in creation of study programs and tuition of professional subjects;
 - * cooperation in creation of the students' final papers;
 - * cooperation in arrangement of practical training and professional excursions;
 - * participation in organization of contact days for the students, including potential recruitment of the graduates;
3. other forms of cooperation:
- * lease of university premises (lecture rooms, accommodation, catering or leisure time capacities);
 - * participation in utilization of facilities, e.g. IT equipment, specialized laboratory apparatuses and equipment.

3 Examples of Good Practice

Successful application of the triple helix model in practice can be documented on the example of two technical faculties of Pardubice University, the Czech Republic: the Faculty of Chemical Technology and the Jan Perner Transport Faculty.

3.1 Faculty of Chemical Technology of Pardubice University

The Faculty of Chemical Technology of the University of Pardubice was established in 1950 and focuses on tuition of chemistry and technical

chemistry, material engineering, chemical technologies, biology and biology-chemistry subjects, and management processes. Nowadays, it consists of five institutes, seven departments and another 30 service workplaces. As at 31 December 2011, the faculty had 2,204 registered students.

Partnerships of the Faculty of Chemical Technology and the practice, as structured

interviews with the faculty's managers and academic workers imply, have several forms.

The key forms of such partnerships are now projects implemented by the faculty in cooperation with selected partners, financed from the European Structural Funds, namely from the Operational Program Education for Competitiveness. Table 1 shows the basic characteristics of these projects.

Table 1 - Partnership projects of the Faculty of Chemical Technology of the University of Pardubice financed from the EU sources within the programming period 2007-2013

Name of project	Funds in CZK	Partners	Implementation period
Innovation of study programs "Special chemistry-biology branches of study" at Pardubice University	18,094,400	Regional Hospital of Pardubice, a.s.; MeDiLa, s.r.o.	1 June 2009 - 31 May 2012
Innovation of tuition of study branches "Economy and management of chemical and food industry enterprises" at Pardubice University	7,911,600	Paramo, a.s.; Synthesia, a.s.	1 October 2010 - 30 September 2013
Innovation of tuition of chemical and process engineering and environment at Pardubice University	13,602,500	Empla AG, s.r.o.; Tebodin Czech Republic, s.r.o.	1 October 2010 - 30 September 2013
Innovation and interdisciplinary interconnection of tuition in the areas of energy materials and construction of buildings	17,256,700	Czech Technical University in Prague	1 December 2011 - 30 November 2014
Partnership for chemistry	27,910,200	Czech Technological Centre for Inorganic Pigments, a.s.; Deza, a.s.; European Institute for Human Resources Development; Fatra, a.s.; Lovochemie, a.s.; Precheza, a.s.; Preol, a.s.; Synthesia, a.s.; VUOS, a.s.	1 February 2012 - 31 January 2014

Source: Created on the base of [10, 15].

Another group of implemented projects is represented by scientific projects supported from the national institutional sources. The following three Basic Research Centre program projects are being implemented within two long-term research intents with support of the Ministry of Education, the Czech Republic: "Prospective Inorganic Materials", "The Centre of Bio-molecules and Complex Molecule Systems", and "The Centre of Biophysical Chemistry, Bio-electrochemistry and Bio-analysis. New Tools for Genomics, Proteomics and Biomedicine". Some other projects are being implemented in cooperation with the Grant Agency of the Czech Republic and the Technology Agency of the Czech Republic. See more [18].

Another important form of partnerships is participation of a faculty in so-called joint workplaces. They are, above all, Joint Laboratory of NMR Spectroscopy of Research Institute for Organic Synthesis a.s. and the University of Pardubice, Joint Laboratory of Analysis and Evaluation of Polymers of SYNPO a.s. Pardubice and the Faculty of Chemical Technology, Joint Laboratory of Applied Medical Science of the

Regional Hospital of Pardubice a.s. and the Faculty of Chemical Technology, and Joint Laboratory of Membrane Processes of MEGA a.s. Straz pod Ralskem and the Faculty of Chemical Technology. See more in [19].

A special form of cooperation is represented by involvement of the Faculty of Chemical Technology in the medical and pharmaceutical cluster of NANOMEDIC. The sense of this cluster is to cooperate on research, development, production and commercialization of products for wound healing, tissue substitution and devices for specific drug delivery, gene therapy with the aim to achieve the world market. [8]

The organized conferences based on cooperation not only with the entrepreneurial sphere but also with other universities can also be considered as a beneficial form of cooperation with external entities. They are, for example, the following conferences: Nanomaterials and Nanoarchitectures, New Trends in Research of Energetic Materials, Symposium on Graphic Arts, International Days of Materials Science or Joint Czech-Hungarian-Polish-Slovak Thermoanalytical Conference.

Another form of cooperation is participation in international and national professional associations. As for international associations, the Faculty of Chemical Technology is now a member of more than 50 associations. For example, the American Chemical Society, the Federation of Paint Chemists and Technicians Associations for Continental Europe, the International Union of Pure and Applied Chemistry, the International Society of Electrochemistry, the Materials Research Society, the Oil and Colour Chemists Association, the Technical Association of the Graphics Arts, and the Technical Association of Pulp and Paper Industry. [16] As for national associations, the faculty is a member of the Czech Membrane Platform, the Czech Chemical Society, and the Czech Industrial Chemistry Society. [17]

We can also find some other forms of cooperation with the entrepreneurial sphere. We can mention both professional counselling or expert's opinions, and cooperation in preparation of bachelor, diploma and dissertation theses, provision of educational courses for company employees, but also participation of professionals from the practice in tuition, or practical training and excursions to partner enterprises.

The above mentioned forms of cooperation are organized by the faculty management in cooperation

with the university management, or by the managers of individual departments and institutes, or directly by individual academic workers.

3.2 Jan Perner Transport Faculty of Pardubice University

The Jan Perner Transport Faculty of the University of Pardubice was established in 1992 and focuses on tuition in the area of transport and connections, specifically in the program of transport technology and connections, transport engineering and connections and civil engineering. Nowadays, it consists of seven departments and another 6 workplaces. As at 31 December 2011, the faculty registered 2,177 students.

Partnerships of the Jan Perner Transport Faculty with the practice have, just as in the case of the Faculty of Chemical Technology, several forms.

Important forms of partnerships are represented by the projects implemented by the faculty in cooperation with selected partners with support from the European Structural Funds, specifically from the Operational Program Education for Competitiveness. Table 2 shows the basic characteristics of these projects.

Table 2 - Partnership projects of the Jan Perner Transport Faculty of the University of Pardubice financed from the EU sources within the programming period 2007-2013

Name of project	Funds in CZK	Partners	Implementation period
Engineering education as interaction of theory and practice	11,692,900	Centre of Transport Research; C.S.CARGO a.s.; CZ LOKO, a.s.; Prague Public Transport Company, a.s.; Chládek and Tintěra, Pardubice a.s.; Siemens s.r.o.; SOR Libchavy s.r.o.	1 October 2010 - 30 September 2013
Support of practical training and professional activities within innovation of the area of tertiary education at the Jan Perner Transport Faculty and the Faculty of Electrical Engineering and Informatics of Pardubice University	33,924,700	Railway Infrastructure Interoperability, interest association	1 June 2011 - 30 April 2014

Source: Created on the base of [10, 15].

Another group of implemented projects is represented by scientific and research projects supported from the national institutional sources, like e.g. the research intent called "The Theory of Transport Systems" and other projects solved in cooperation with the Ministry of Industry and Trade of the Czech Republic (in 2012 - 6 projects). [21]

Another form of partnerships implemented by this faculty is a joint workplace. It is the Research Centre of Rail Vehicles and Transportation

Laboratory - Joint Workplace of NH-TRANS Ostrava and the Jan Perner Transport Faculty. [14]

Partnerships with external entities are also carried out on the basis of professional conferences, e.g. INFOTRANS, COMITE or LOGI and a number of others.

The Jan Perner Transport Faculty also cooperates, both in the scientific and research and in educational areas, with another almost 50 organizations, like e.g. DHL Express Czech

Republic s.r.o., HÖLMAYR Logistics Czech Republic a.s., Lion Teleservices CZ a.s., Mediaservis s.r.o., PPL CZ s.r.o., PROMOTRANS GROUP SKANSKA CS a.s., TNT Post Czech Republic s.r.o., and World Courier Czech Republic s.r.o. [20] This cooperation has the form of professional counselling and expert's opinions, education of the company employees, but also of participation of experts from the practice in tuition, in preparation of final papers and organization of practical training and excursions to the partner enterprises.

The above mentioned forms of cooperation are organized by the faculty management in cooperation with the university management, or by the heads of individual departments, or directly by individual academic workers.

4 Conclusion

Partnerships of universities and enterprises represent an important source of synergic effects, both from the point of view of universities themselves (their students and employees), and from the point of view of enterprises but also from the point of view of the entire society. The above partnerships, whose theoretical basis is purposefully defined by the triple-helix model, result in a number of benefits. The key benefit can be seen in innovation, or creation, transfer, or modification and utilization of the know-how, whose basis resides in implementation of scientific and research activities carried out by universities in cooperation with enterprises. Another important benefit of such partnerships is the contribution to cultivation of human potential as the human resources' knowledge can be considered as another deciding factor of the economic growth and development in the today's knowledge-based society.

Partnerships of universities and enterprises can have a number of forms, as specified and documented on examples in the paper. The scope of cooperation and particular forms of partnerships are given for one thing by the branch orientation of universities and faculties, where technical faculties and universities have a significantly better position, for another by the length of existence of a university workplace, and for another by the quality of their employees and students, their experience in the area of partnerships or the quality of organization of the partnership. At the same time, a considerable role is also played by the willingness to share information and knowledge both from the side of universities, and primarily from the side of enterprises, which is nowadays a significantly limiting factor [23].

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