On the Problem of Utilization of Scientific-technological Potential of Young Researchers

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ABSTRACT: *The paper will be orientated on the theoretical and methodological aspects of relations among young researchers and students on the universities and the praxis – industry, firms, small and medium size enterprises (further SMEs) etc. It deals with legislation framework of this problem and its gaps in Slovak Republic. It is necessary for Slovak universities and all Europe to increase co-operation between universities and business surroundings, mainly in relation of innovative processes. University become active element in business environment development and it declares the responsibility and its place in modern society. There is enough theoretical experiences in Slovakia but minimum practice in technology transfer to the SMEs.*

1 INTRODUCTION

The intention of this contribution is to provide the general and basic information about the theoretical and methodological aspects of relation among young researchers and students, small and medium size enterprises, industries etc. as well as the description of principles and procedures used in the process of their cooperation.

One of the thirteen objectives for three strategic goals in the education and training area of EU countries is the developing the spirit of enterprise. The promoting of education for entrepreneurship and self-employment is also a goal included in the EU employment guidelines. The importance of developing new forms of work and business are related with new forms of cooperation between academic and industrial partners as well as with the new perception of importance and sense of enterprising and creative potential of young researchers and students.

The knowledge society provides new opportunities to start independent businesses mainly small and medium size enterprises or individual firms. The processes of outsourcing in the large industries and traditional firms also create the possibilities for new independent firms. In this context there are important two directions of the activities at higher education institutions:

- Including to education and training system the elements promoting the creativity and innovations by young researchers and students,
- Promoting the acquisition of skills needed to set up and run a business.

For monitoring and evaluation of the state and results of education and training systems will be used qualitative and quantitative tools than the indicators for example percentage of education and training institutions providing counselling and guidance for setting up businesses, percentage of education and training institutions providing the teaching of entrepreneurship at various levels and scale of this teaching.

In Slovak Republic (further SR) at present there are 22 state higher education institutions of which nine are more or less traditional universities, three universities of technology, three higher education institutions of art and music, one university of economics, one university of veterinary medicine, one agricultural university, two military academies and one police academy. In 1999 the first non-state higher education institution orientated on management came into existence. Higher education institutions provide education at three basic levels – bachelor degree, master degree and PhD degree. The postgraduate study is the highest form of higher education and its aim is to prepare the PhD students for

independent creative research work by acquiring comprehensive theoretical knowledge and to master the methiods of scientific work by demonstrating the, in a given scientific project.

2 CONNTACTS OF YOUNG RESEARCHERS AT UNIVERSITIES WITH PRAXIS

The changes of environment in term of technology, policy, market conditions etc. as mentioned above evoke and make new requirements both on the students or on the graduates and also on the permanent innovation, the change of the basic educational principles and learning. The fast technology changes in the information and communication technology require the "intelligent" education with "balanced" using of the long-valid principles and the newest information. The changes of the curriculum, contents and forms of education or learning are characterized by conversion from classic to integrated education or learning.

Problems of connection of two different milieu, academic or scientific and praxis, problems of knowledge transfer in the both courses with the objective of better valorisation of this potential is not simple. It requires solution a lot of legislation questions, creation of conditions for financing this process etc. By our opinion the key factor for successful transfer knowledge from academic to business milieu is the serious knowledge of requirements, needs, demands of firms in the area of new technologies, as well as the understanding of the sense and style of thinking of firms. On the other side the business milieu can provide to academic milieu some impulses in the orientation of research and development, in the changing of curricula, and innovation study plans. Benefit from the transfer technology has to both sides – researchers and firms e.g. win-win effects.

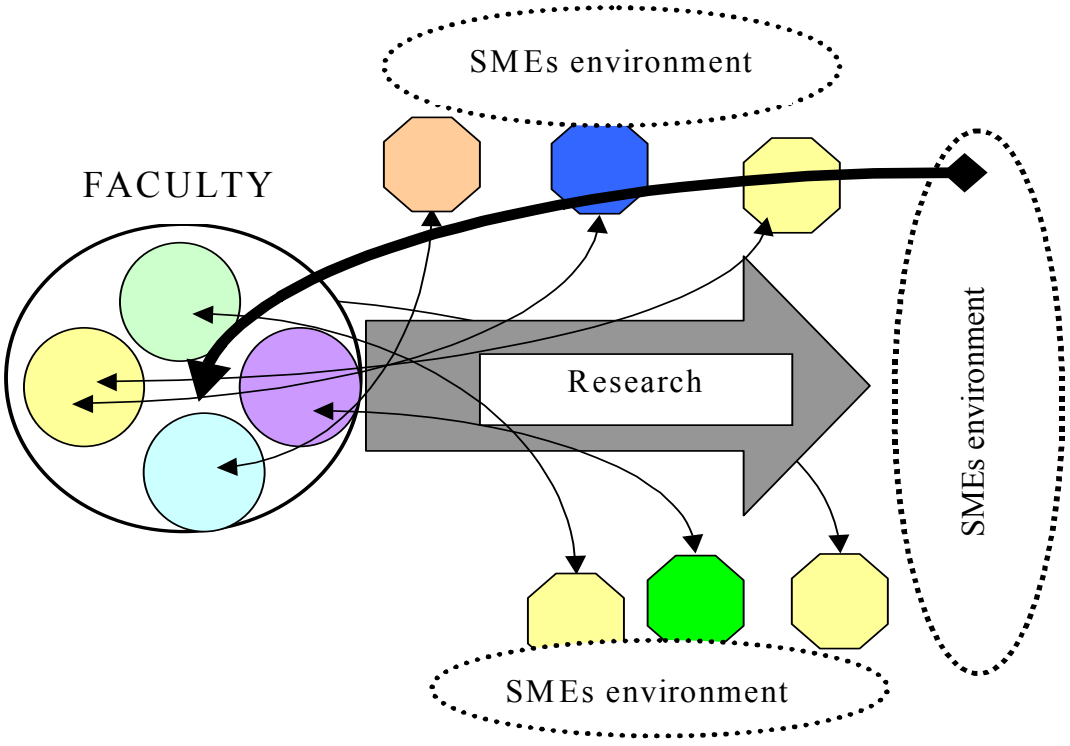

Figure 1 - Model of connection of faculty and SMEs environment

In the SR the situation in this area can be described by following sentences:

- Universities are the potential for innovation processes in the business environment but they are not too active in this process
- SMEs are not interested in the potential of researchers mainly young peoples at universities or doctoral students.

One of the more effective ways for solving the problem of better conditions of young researchers is fastening the relations between scientific-technological potential and business environment. This process has to begin from teachers or professors and the students at universities. The relations between professor and student have several dimensions. The diploma work or dissertation or another scientific works of

students are able to provide solution for SMEs and in the conditions of University of Žilina we have some experiences in this cooperation with the software firms or high-tech firms.

3 INSTITUTIONAL MODELS FOR TRANSFER KNOWLEDGE AND TECHNOLOGY

The more effective form of connection of both environments – academic and entrepreneurial – is institutional form on the basis industrial liaison offices at faculties or universities, agencies, technology centres, science technology parks, entrepreneurial incubators, spin-off firms, start-up firms etc.

a) Model spin-off firm

The model uses the scientific-technological potential of the faculty or university, mainly students and young researchers (Fig. 2). The spin-off associates the students and young researchers and they create the contact with praxis, mainly with SMEs in the region by using the contacts of departments and workers at faculty or university. Spin-off uses the laboratories at faculty, departments and university and provides the new opportunities for their using.

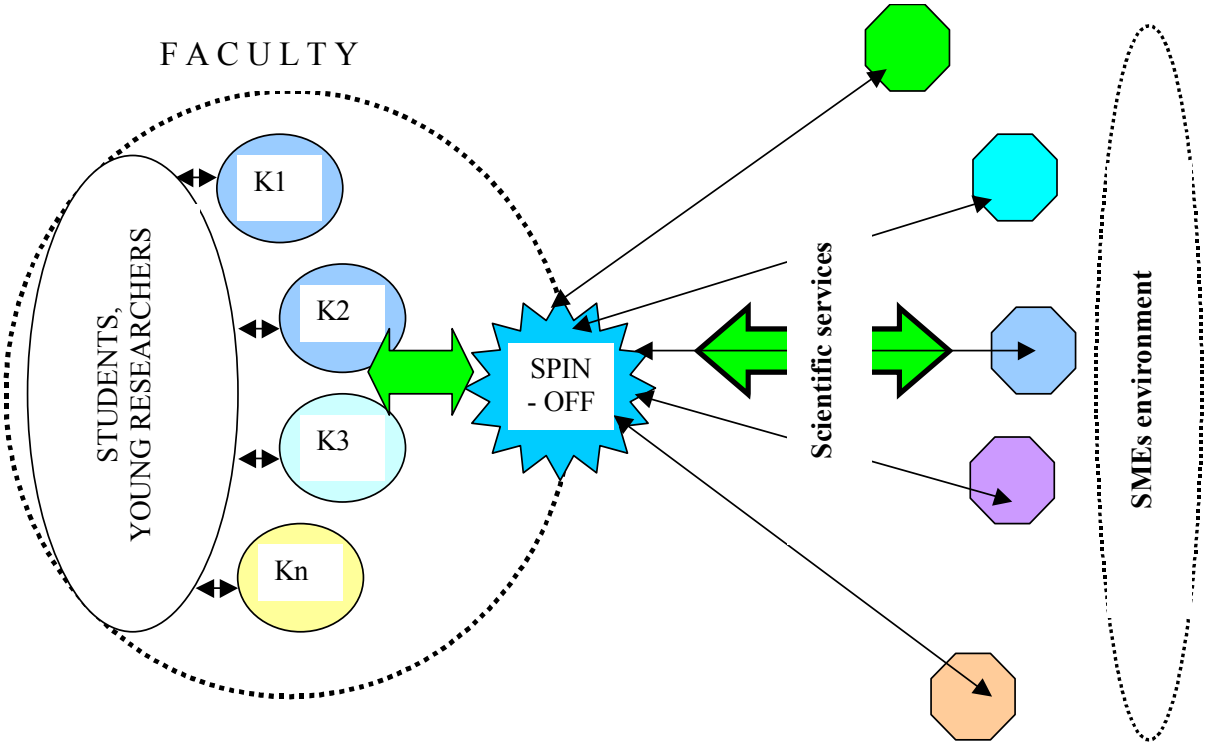

Figure 2 - Model SPIN-OFF firm

b) Model start-up agency or firm

The start-up model is based on the creation of independent unit, agency that creates on the smart idea, business plan in cooperation between teacher and student (Fig. 3). Agencies use the scientific experiences and apply theoretical knowledge to industry. They realise the knowledge transfer and the activity orientated on the innovative development of SMEs, e. g. technology audit, certification of products, the testing etc. The start-up agency can be created in business incubator.

Why create start-up agency?

- Implementation of smart ideas in the praxis
- Using the scientific potential and ideas of the university workers
- Understanding the requirements of praxis and orientation of scientific works on the development
- Development of scientific environment quality needs resources.

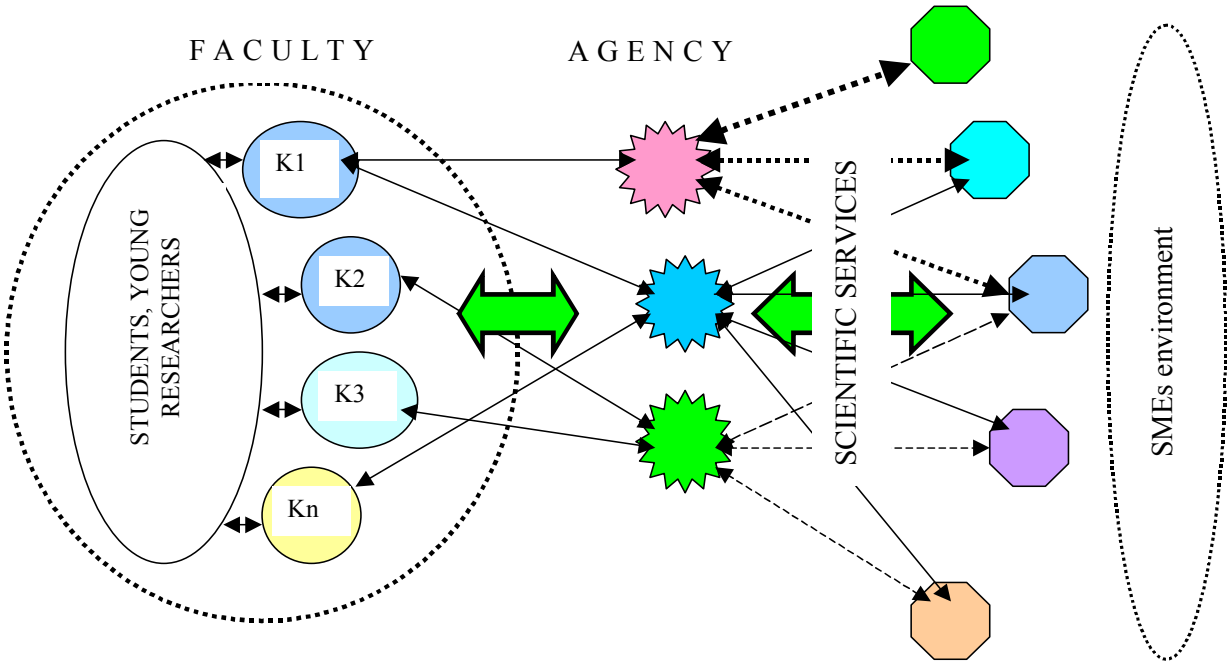

Figure 3 - Model start-up agency and firm

c) Training centre for managers of new type of firms

The concept of training of managers of new type of firms (start-up, spin-off, etc.) must be an organic part of the educational and training system at faculties and universities. The training for these managers includes mainly following themes:

- Marketing management
- Economics
- Accounting and taxes
- Project management
- Coaching
- Enterprise management
- Finance management
- Strategic management
- Human Resources management
- Legislation
- Business plan

The citizens, participants in the "knowledge society" or "information society" have to develop competence in handling technical equipment and must be in the position to judge the reliability and seriousness of information sources for their own further private and business life. In this context it is necessary to accelerate the development of students ability in ethics, communication, philosophy, foreign languages etc. or "soft" competencies of students. The engineers communicate with other people or institution directly or indirectly and the effective communication is enormous important for the right transfer or transmission of data, information and knowledge – the reason of subject "communication". The exchange of information and the sense is to secure the mutual understandings. The graduates of the technical universities are the ones who are expected to:

- Know how to manage working collectives,
- How to be active in the areas of research, development, production, marketing, sales, logistics, innovations, finances, etc.

They must solve a lot of problems related with entrepreneurial or business ethics, environmental ethics, ecology – the reason of subject "ethics" etc. Business ethics enables and helps the engineers:

- To be informed of many different ethical approaches used when solving ethical problems of practical life,

- To distinguish an ethically correct behaviour from the unethical one and to be ethical and socially responsible,
- To form orientation of values in a sense of searching for the social good and well-being,
- To seek optimal ethical solutions for all the concerned subjects,
- To apply ethical principles in the business field, the field of technical engineering etc.

4 CONCLUSIONS

Topic of this contribution try to mention three basic problem areas in relation young researchers at universities and SMEs environment – system's environment and system, potential of researchers, ways for using and valuation of scientific potential at faculties and universities. The aim is to create a functional system of institutional support of effective Industrial Liaison Offices in Slovak Universities, Scientific, Technical and Research Institutions, for knowledge transfer and technology transfer. The promotion of transfer processes should be integrated part of university tasks in the regional innovative policies. The main forms of knowledge and technology transfer from research and universities to SMEs´ are identified and also the barriers in this area are described.

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