

Presentation of state-wide research results in collaboration between SMEs and Slovak universities in the field of post-graduate studies

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Abstract — Technology transfer represents any activity by an academic or research organization, which involves the transfer of expertise (usually, but not always, the technical and/or scientific expertise) into commercial organization, or the process of creating a business organization based on an academic or research organization's expertise. The article explains activities, which can be considered as falling within the above -mentioned definition of technology transfer in the context of higher education. The article deals with the statewide research concerning collaboration between small and middle enterprises (SMEs) and Slovak universities in the field of post -graduate studies. It was realized in Slovakia within the project entitled "Development of conditions for realization of young researchers scientific potential". To the research target groups belong post -graduate students, their supervisors, training institutes as well as SMEs, which are involved in the cooperation with universities. The main aim of the research is identification and quantification of the post -graduate studies features in relation to transfer of its results to business environment. At the same time the research is focused on searching for reasons of low interest of business sphere in findings of young researcher's work. The research is realized in the form of electronic questionnaire. The methodological process of the mentioned collaboration monitoring is aimed at all three phases of post -graduate thesis preparation. The starting point represents analysis concerning assessment whether the themes reflect up-to-date problems that occur in actual practice of business environment. Secondly, the manner and form as well as quality of the cooperation with SMEs are evaluated. Finally it is important to monitor opportunities for realization of results of post-graduate students' work in solving topical problems, which originate from business activities. The article illustrates the interesting findings resulting from the described research and recommended measures for development of collaboration between business and academic environment.

Index Terms — Cooperation, post-graduate studies, research results, Slovak universities, small and middle enterprises.

THE RESEARCH METHODOLOGY

The statewide research concerning collaboration between small and middle enterprises and Slovak universities in the field of post-graduate studies was realized in Slovakia within the project entitled "Development of conditions for realization of young researchers scientific potential". [1]

The main objective of the research is identification and quantification of the post-graduate studies features in relation to transfer of its results to business environment. At the same time the research was focused on searching for reasons of low interest of business sphere in findings of young researcher's work.

The research was realized in several stages, which were in line with effective progress of work, recommended by this type of marketing research. To the research target groups belonged post-graduate students, their supervisors, training institutes as well as small and middle enterprises, which are involved in the cooperation with universities. In the process of the data gathering and analysis relating to the research objectives, the market place was divided into distinct segments, because each subgroup requires a specific approach. The segments of research respondents were defined in academic as well as business environment, as follows:

- Both internal and external post-graduate students (the present as well as the former ones) and young research workers
- Supervisors from universities and from the Slovak Academy of Science
- Segment of respondents from business sphere.

The above mentioned business sphere involved:

- Small and middle enterprises, where some external post-graduate students work
- Small and middle enterprises, which established a cooperation with a university
- Small and middle enterprises, which are known as enterprises with innovative strategy.

In order to achieve adequate representative research results, which will lead to more market knowledge and better-informed decision-making, the necessary size of respondents sample was determined. The number of respondents was specified in accordance with obtaining of information on number of post-graduate students in Slovakia and rough estimate of number of small and middle enterprises in the described segment of respondents from business sphere.

The research was realized in the form of direct-mail questionnaires. The needed e-mail addresses of potential respondents were searched using Internet and databases of universities. The questionnaire structure complies with the requirements to obtain information, which can be utilized for evaluation the technology transfer level between university and business environment from several points of view. The methodological process of the collaboration monitoring was aimed at all three phases of post-graduate thesis preparation. The evaluative criteria involved in the partial objectives are namely:

- **The first partial objective:** The starting point represents analysis concerning assessment whether the themes of thesis and research works reflect up-to-date problems that occur in actual practice of business.
- **The second partial objective:** Secondly, the manner and form as well as quality of the cooperation with small and middle enterprises are evaluated. The evaluation was performed during the period of the thesis or research work preparation.
- **The third partial objective:** Finally it is important to monitor opportunities for proper utilization of the post-graduate students' work results in solving topical problems, which originate from business activities. It is also important to make the thesis results visible and disseminate them. [2]

THE RESEARCH RESULTS

Within the research we addressed:

- 347 post-graduate students and young research workers
- 1002 supervisors
- 200 small and middle enterprises.

The rate of return was up to the end of July as follows:

- 32,3 per cent, that is 112 post-graduate students and young research workers
- 15,1 per cent, that is 151 supervisors
- 20 per cent, that is 40 business firms.

The following sections of the paper outline the research results, which were analyzed for the particular participated segments. The Table 1 shows some of the selected research results, which are very interesting. We remark that the sum of the partial results, which are in Table 1 expressed as a percentage, is less than one hundred percent because of the fact that some questions were optional.

Conclusions from the segment of post-graduate students and young research workers

- In the post-graduate students' opinion, the thesis themes originate mostly from initiative of a training institute.
- The students regard their thesis themes as topical or averagely topical.
- The respondents evidently approved of the need that the themes should relate to problems of business practice.
- During their thesis preparation they were mainly in a direct contact with some firms only on rare occasions. Approximately thirty per cent of students answered that these contacts weren't needed.
- In case that cooperation between business and academic environment was established, the partnership was without problems or at average level.
- In general the respondents were not able to consider the genuine interest of enterprises in their thesis results. It is assumed that they didn't even try to establish partnership with business practice.
- The post-graduate students think that the theoretical and practical results of their work could be practically used only in part.
- They regard the start of their own company as a perspective form of their self-realization.

Conclusions from the segment of supervisors

- The supervisors expressed, that the thesis themes mainly arise from knowledge of specific needs of practice.
- The supervisors mostly verify the thesis themes topicality.
- They think that the cooperation with some firms is needed only in case that the thesis theme requires it.
- The established cooperation with the firms by solving the thesis is regarded as good.
- The significant number of supervisors isn't interested if the post-graduate students results were used in practice.

TABLE I
SOME OF THE RELEVANT RESEARCH RESULTS

Partial objective	Segment of post-graduate students	Segment of supervisors	Segment of business sphere
1.	<p>The theme of your thesis originated</p> <ul style="list-style-type: none"> From initiative of actual practice following the requirements of some specific firm and at the same time the negotiator was the training institute (9%) From initiative of training institute /department/ (73%) From suggestion of a scientific institution, e. g. the Slovak Academy of Science (1,6%) Other thoughts (14,8%) <p>Do you thing that the themes of thesis or scientific works should arise from the topical needs of business and solve some specific problem in an enterprise?</p> <ul style="list-style-type: none"> Yes, I think so. (55,4%) No, I don't think so. (3,3%) On some conditions. (34,7%) 	<p>The themes of thesis, which you as a supervisor have suggested arose from</p> <ul style="list-style-type: none"> Your proposal without contacts with business practice. (6,8%) Your proposal reflecting the needs of business practice. (29,8%) Proposal and requirements of some specific enterprises (5%) Your initiative – according to adequate knowledge in a specific field of science. (44,1%) Other thoughts (10,6%) 	<p>Does between your firm and some of universities or faculty exist cooperation in working-out themes of thesis?</p> <ul style="list-style-type: none"> Yes – regularly. (15%) Yes – rarely. (15%) No – despite the fact that we know some areas for such cooperation. (7,5%) We don't know about any possibilities of the cooperation. (52,5%) Other thoughts. (5%) <p>In case that you know some thesis themes, do you think that they can be regarded as topical and useful for your firm?</p> <ul style="list-style-type: none"> Yes, they can. It is clear from the thesis themes that supervisors who understand the topical problems created them. (15%) Some themes are topical and some aren't. (12,5%) I don't think so. In the majority of cases the themes don't reflect the needs of business practice. (22,5%) Other thoughts. (2,5%)
2.	<p>Were you during your thesis preparation in a direct contact with a firm, whose activity has relation to the problem solved in your thesis?</p> <ul style="list-style-type: none"> Yes, I kept contact with a firm during the whole period of my thesis preparation. (13,9%) On rare occasions. (44,3%) No, the contact was not needed. (29,5%) 	<p>Is in your opinion the cooperation with some enterprise during solving of thesis or scientific works necessary or needed?</p> <ul style="list-style-type: none"> Yes, it is - because the results can be applied in practice. (19,3%) Yes, it is. It is important to analyze real /no virtual/ data. (18,6%) Sometimes it is. It depends on the thesis content. (50,9%) No, it is not - because firms are not interested in the cooperation. (1,2%) No, it is not. The cooperation is not necessary. (2,5%) <p>In case that the cooperation with a firm during post-graduate study was established, how would you evaluate its quality?</p> <ul style="list-style-type: none"> Excellent (5%) Very good (30%) Good (30,6%) Satisfactory (7,5%) Inadequate (4,4%) 	<p>Has your firm any experiences with cooperation with post-graduate students?</p> <ul style="list-style-type: none"> Yes, it was profitable cooperation. (17,5%) Yes, we have. The cooperation has not brought expected results. (5%) It was a bitter experience. (2,5%) We have not had establish such a cooperation. (40%) No, we have not such experiences. We don't plan to establish this kind of cooperation. (2,5%) No, we have not such experiences but we would like to establish the cooperation to support innovative processes in our firm. (27,5%) Other thoughts. (0%)
3.	<p>Do you think that theoretical and practical results of your thesis will be practically usable?</p> <ul style="list-style-type: none"> Fully (24,6%) Partly (48,4%) On an average (22,1%) With difficulties (1,6%) No unusable (0%) 	<p>How many thesis or scientific works have during the last three years found their full or partial application in practice?</p> <ul style="list-style-type: none"> Specify their number and specialization. (38,4%) I don't know. (38,4%) 	<p>Providing that you are involved in cooperation with university environment in solving some thesis or research works, do their results contribute to improvement of innovative activities in your firm?</p> <ul style="list-style-type: none"> Yes, they do. (20%) No, they don't. (27,5%) <p>Would you be interested in opportunity to establish employment or cooperation with authors of a thesis or research work, whose results could be beneficial for your firm in future?</p> <ul style="list-style-type: none"> Yes, I would. (47,5%) No, I would not. (45%)

- Many respondents from the segment of supervisors see no relations between the thesis themes and further employment opportunities of post-graduate students.
- The supervisors underlined their full support for establishment of high-tech firms oriented on development and practical application of the latest knowledge.

Conclusions from the business sphere segment

- Speaking in general, the enterprises don't know about possible cooperation in the thesis or research work preparation.
- If some enterprise in their practice meet with the thesis themes, they say that approximately one third of them are practically usable.
- Nowadays the enterprises don't have sufficient experiences as for the cooperation with post-graduate students. Where the cooperation was adequately developed, it was successful.
- The majority of respondents expressed acceptance with benefit of technology transfer between business and academic environment leading to improvement of their competitiveness.
- Too few enterprises use the thesis results. They expressed insufficient knowledgeableness as a reason of this negative fact.
- The business firms in general don't know where they could obtain information about the solved scientific and research problems and they prefer detailed information from the media.
- Approximately one half of the respondents expressed that they would be interested in opportunity to establish employment or cooperation with authors of some thesis or research works whose results could be beneficial for their firm. The rest of the respondents answered in a negative way because of the financial problems.
- The establishment of new high-tech firms oriented on development and practical application of the latest knowledge would be accepted by most enterprises.

SUMMARY

Finally I would like to draw conclusions from the described research results. The statewide research realization will lead to critical analysis of the current level of the cooperation between business and academic environment. The evaluation pointed at predominant willingness to improve and develop the collaboration, which results in bilateral advantages. This research discovered general support for establishment of the firms oriented on knowledge transfer from university to business practice.

The research will continuously continue and its results become a basis for taking adequate measures for improvement of post-graduate studies at Slovak universities.

REFERENCES

- [1] Statewide Program of Science and Research No. 2003 ŠP 20-02805-03 "Development of conditions for realization of young researchers scientific potential"
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