

INSIGHT INTO CHALLENGES FOR RESEARCHERS AND UNIVERSITIES IN BULGARIA

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Abstract: The paper presents the results of studies carried out recently among Bulgarian stakeholders to investigate the career and mobility of researchers, as well as problems in industry-academia collaboration. The methodological approach is inspired by the FP7 E*CARE and SISTER projects of Sofia University. The paper presents some general issues for research and innovation landscape in Bulgaria, and outlines the case of Technical University of Sofia.

Keywords: industry-academia collaboration, skills needs

1. Introduction

Since the Lisbon Summit 2000 at European level were launched a number of initiatives towards building the European Research Area, and in particular focused of researchers, their career path and mobility, as well as building stronger linkages between industry and university. The need for encouraging innovation and knowledge transfer, to focus on human resources skills and capacities necessary for the knowledge economy, and to facilitate the exploitation of research results by industry, are issues outlined at several for a in Europe. As a major obstacle for industrial application of research results is considered that universities in Europe do not have well-developed intermediary structures, and there is a lack of familiarity of university staff with the economic aspects of research [1,2].

The general picture of innovation in Europe [3] shows that there are four groups of countries – leaders (mainly the Nordic countries), followers, catching up and trailing. Bulgaria has scores below that of the EU25 and the innovation leaders, but shows faster than average innovation performance improvement and belongs to the group of catching-up countries. In Bulgaria, two strategic documents have focused on, first, research strategy, and second, on innovation and technology transfer. Nevertheless, the position of Bulgaria on European landscape in research and innovation did not change significantly: according to the European innovation and R&D statistics, the situation is one of the worst in the EU. Despite that the total amount spent for R&D is increasing in the last few years, it takes a very low share from GDP – the public R&D expenditures are 0,38% (by 0.65% EU25), and only 0.11% coming from private sources (by 1.2% EU25). The innovation firms in Bulgaria also seem to be very low compared to other EU Member States and EU27 level (Figure 1) [4].

The paper presents therefore some results of recent surveys and on this base outlines some challenges of the research landscape in Bulgaria, as well as related to the career and mobility of researchers. In addition, a more recent survey among researchers of the Faculty of Automation,

Technical University of Sofia presents further needs in this area.

2. Survey Findings on Researchers' Environment

The objective of the E*CARE survey was to gather structured information on remaining and emerging obstacles concerning researchers' career and mobility, and on recent trends at national level in the partners' countries (Austria, Bulgaria, Czech Republic, Cyprus, Greece, Hungary, Switzerland, Slovakia). In particular, the survey focused on the implementation of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers, as well as the Mobility Strategy of the EU. The survey focused on the following main groups of questions:

- Legal, administrative, social, practical barriers for mobility and career of researchers
- Attractiveness of researchers' career
- State and institutional support to researchers
- Employment conditions for researchers
- Industry-academia collaboration

The survey in Bulgaria was answered by 36 respondents from various stakeholders and 106 researchers, among them 54% women. Most of the researchers are from technical sciences (37%) or humanitarian and social sciences (40%), taking post-doctoral (19%) or senior research positions (49%).

The state policy and the general research environment seem to be the main threat for researchers. Most of them (54%) consider that the state does not support researchers or ensures only a minimum support (39%), and that Bulgarian schools rarely encourage their students to enter a research career path (40%). Among the main incentives for attracting young people in research are considered higher salary, followed by the need to improve research infrastructure and decrease the bureaucracy for obtaining research degrees and positions. The results in Bulgaria do not differ much from the respondents from Greece, Czech Republic

or Slovakia, where on average the research funding and stimulation for research is dominating in the opinion of researchers (85%), followed by salaries increase (72%), improvement of infrastructure (63%) and decrease of bureaucracy (31%). Researchers consider the opportunities for interesting work and career development as the most important conditions for their career development (87%), followed by financial, material and moral stimulus [6].

It is interesting to note that most Bulgarian researchers do not like to change their work to a position in the industry (67%), and only 28% show willingness to go to the private sector. In all participating countries of E*CARE survey the collaboration between the academia and industry is not very well developed, whereas intensive joint research projects are pointed out by 10% of the respondents, 8% consulting to industry and 14% participation of industrial experts in research boards [7].

3. The Case of Technical University of Sofia

In the field of engineering, the Technical University of Sofia (TU) is the leading Bulgarian higher education institution. There is hardly any industry, company, or plant in Bulgaria where TU graduates are not employed. In addition, TU has trained most of the academic staff working at other higher technical schools in Bulgaria.

TU proved that it is very competitive in the engineering research and training both at national and EU level. It has participated in more than 1200 international projects, and in the national projects the industrial research has dominated*. In 2007 TU gained important national awards for its research activities: for a second year - the national award of the Agency for Energy efficiency, the award of MES for highest financial contribution gained from international projects, and the award 'ICAR' of the Bulgarian Industrial Association – for its scientific and applied research.

The Faculty of Automation (FA) was established in 1974. It is one of the biggest faculties of TU, and the leading centre for research and education in Control Engineering in Bulgaria. Its members are authors of 112 university course-books and 59 monographs. The Faculty lecturers teach students from 6 basic faculties of TU, as well as from 3 Foreign Education Programme Divisions – the English Language Faculty of Engineering (ELFE), the French Faculty of Electrical Engineering and the Faculty of German Engineering Education and Industrial Management. FA has been attracting a large number of high-quality students, part from which are from Greece, Turkey, India, etc. The annual average number of papers in prestigious journals and conferences (IFAC, IMEKO, IEEE, IFIP, etc.) of FA amounts of about 120.

Despite its successes, FA has experienced some problems in the last few years based on the general education and research environment in Bulgaria. With an objective to strengthen its positioning, a survey among its employees was carried out in January 2009 in order to prepare a SWOT (Strengths Weaknesses Opportunities Threats) analysis. The main goal of the survey was to collect some quantitative data provided by the researchers, but also to

summarize the personal attitudes of the staff and their approach to research activities. It focused on the following issues:

- FA staff experience, skills, and research interests and needs;
- the research priorities according to the staff – on European, on national, and on personal short-term and long-term levels;
- the personal assessment of the organization and work within FA;
- the evaluation of the overall national environment and attitudes toward researchers and research career in Bulgaria.

In the survey participated 26 FA researchers, among them 46% over 45 years, and 35% younger than 35 years. The gender balance was in favor of man – 65% man replied to the questionnaire. Most of the respondents (84%) were in the beginning or at the middle of their research career taken Ass. Professor positions, whereas only 4% had a full Professor degree and 12% – Associate Professor degree. The profile of the respondents further shows that most of them are involved mainly in teaching and research activities, whereas very strong experience in innovation and cooperation with partners have 27% of them. Experience in administrative tasks and work with end-users is lacking by 30% of all respondents, and 61% have strong or very strong experience with new technology acquisition. It is not surprising that FA researchers consider that their lecturing skills and individual knowledge and skills are strongly utilized at FA, whereas management and business skills – at much moderated level. It is interesting to note that the main skills needs of FA researchers are related to 'soft' skills, e.g. for team work, organizational and interpersonal communication and presentation skills (Figure 1), and on a second place, general skills and competences, e.g. related to management of projects, quality, planning, etc. (Figure 1).

As shown in Figure 2, FA researchers have strong publication activity – almost 10% of them have higher than 40 papers at national and international conferences. As the dominant part of the respondents are in the beginning or in the middle of their career, the number of articles in referred

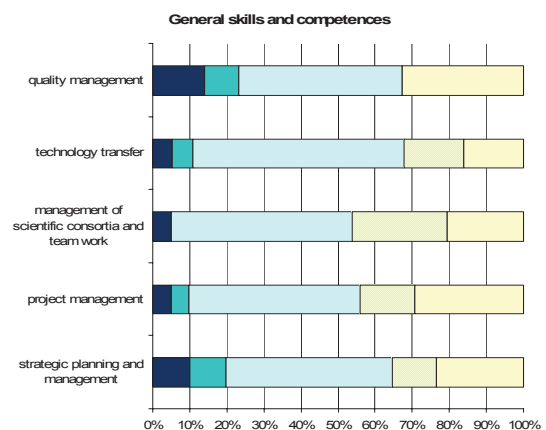


Figure 1. General skills needs.

*Technical University – Sofia Annual report 2007

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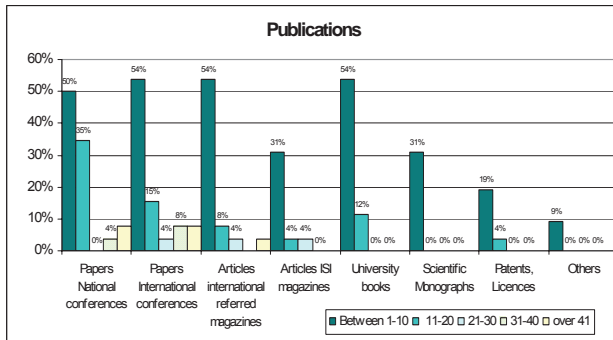


Figure 2. Publications activity of FA researchers.

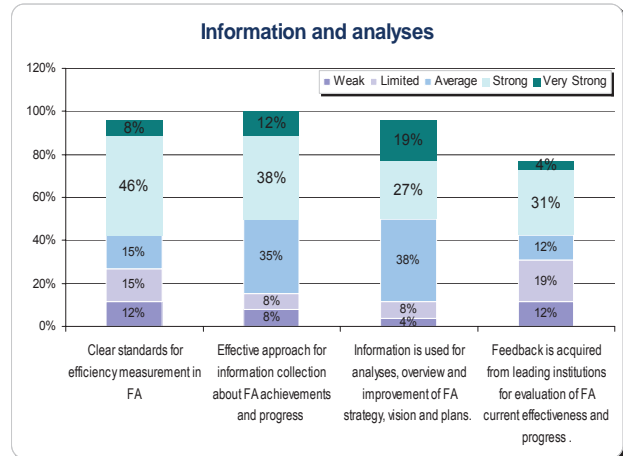


Figure 4. FA information and analysis.

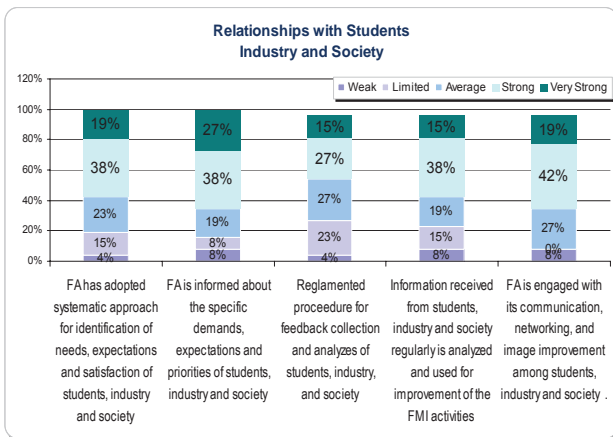


Figure 3. FA collaboration with students, industry and society.

and ISI magazines shows a good level of FA research results, as well as the availability of patents or licenses by 19% of respondents.

One possible weaknesses of FA is its relations with students, industry and society (Figure 3). Only 19% of the respondents are confident that FA has adopted systematized processes for identification of students' needs and satisfaction. The majority agree that FA regularly collects and uses external feedback and information from students, society and industry in order to improve its internal processes and activities. On the other hand, FA is not considered as participative and communicative organization – it rarely issues messages to the society. The weak communication to the society in general results in lack of documents and evidences for the successes of FA, especially in electronic and printed media.

In addition, FA respondents consider that there is a need for better efficiency measurement at their Faculty, as well as building its strategic vision on bases of clear knowledge of the external environment, FA achievements and positioning (Figure 4).

Table 1. SWOT analysis of FA

	STRENGTHS	WEAKNESSES
INTERNAL FOCUS	<ul style="list-style-type: none"> ▪ strong theoretical basis of engineering education ▪ well-recognized research in Bulgaria and abroad and PhD education ▪ wide reputation and substantial research outcomes, incl. patents ▪ strong contacts with a large number of private and state-owned companies ▪ successful spin-offs set up by researchers 	<ul style="list-style-type: none"> ▪ ageing of staff and brain-drain ▪ inability to attract young people ▪ need for research and training infrastructure upgrades ▪ fragmented nature of research activities and need for priority setting ▪ not sufficient recognition of research needs of economy and society ▪ not sufficiently stimulating environment
EXTERNAL FOCUS	<ul style="list-style-type: none"> ▪ Faculty has autonomy in its own management ▪ ability to work with Bulgarian industry for students internships ▪ good linkages with other Bulgarian research organizations ▪ enhancing educational contacts with EU universities and research organisations for common research projects 	<ul style="list-style-type: none"> ▪ persistent education just in the strong technology fields excluding interdisciplinary competences required from the business ▪ not keeping abreast of the advance of research and innovation ▪ decline of the education quality and not meeting the industrial demands ▪ not offering consultation services to industry and policy makers, and loosing recognition by the society and businesses ▪ lack of state policy for research and encouragement of young people in researchers' career

A summary of the survey results made among FA staff and users is indicated in Table 1. It is obvious that FA has a lot of strengths and weaknesses which need to be carefully analysed and put into a strategic framework for long-term growth and better integration into the EU research, innovation and education areas.

4. Future Challenges

A lot of efforts are necessary in order to meet industrial demands and enter into strategic long-term partnerships and build a sustainable 'Triangle of Knowledge', as well as to respond to EU focus on university-business collaboration, and the new role considered for universities. Therefore, Bulgarian researchers need to strengthen their capacity for innovation, management and technology transfer, as well as obtain entrepreneurial, science communication skills, etc. A focus of BSc and MSc programmes on building interdisciplinary skills and the skills needed for the knowledge economy and society might be a further challenge for universities and researchers.

Generally, the links with industry need a lot of changes in order to meet the needs of the knowledge economy. In research, there should be established more structured contacts for joint research projects, exchange of staff, internships and joint supervision of PhD students, knowledge brokerage events, etc. Higher transparency of research results might be a first step towards better collaboration with industry in research. A regular communication with industry and business organizations will further support the establishment of strong intersectoral collaboration and linkages.

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