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The recruitment of young people for R&D activity and the issue of gender equality – The case of Slovenia

El reclutamiento de jóvenes para la actividad de I+D y el tema de la igualdad de género – El caso de Eslovenia

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Abstract: In the last few years European Union and its member states are facing with a big policy challenge how to increase the human resources in R&D activities and how to attract young people for entering science careers, first of all women. Although the participation of women in science has increased in recent decades, they are still too often dispriviliged and underrepresented in everyday scientific practice. In the article, there is addressed the case of Slovenia. There is analysed the recruitment of young female researchers in "The Young Research Programme" in Slovenia and mentor's support to the female PhD candidates. The results of empirical study show that regardless of the efficiency of "The Young Research Programme" it has not succeeded in improving the gender structure of young researchers in Slovenia. Moreover, the authors of empirical analysis come to the conclusion, that on the micro level young female researchers receive less intellectual and psychological support from their mentors than their male counterparts.

Key-words: women in science, gender equality, young researchers, mentor's support

Resumen: En los últimos años la Unión Europea y sus Estados miembros se enfrentan con un reto político importante la forma de aumentar los recursos humanos en I + D y la manera de atraer a los jóvenes para incorporarse a las carreras de ciencias, en primer lugar a todas las mujeres. Aunque la participación de la mujer en la ciencia se ha incrementado en las últimas décadas, siguen siendo demasiado desprivilegiada a menudo o insuficientemente representadas en la práctica científica cotidiana. En el artículo, se aborda el caso de Eslovenia. Se analiza la contratación de jóvenes investigadoras en el "Programa Joven de la Investigación" en Eslovenia y el apoyo mentor a los candidatos de doctorado femenino. Los resultados empíricos del estudio muestran que, independientemente de la eficiencia del "Programa de jóvenes investigadores" no ha conseguido mejorar la estructura de género de los jóvenes investigadores en Eslovenia. Además, los autores del análisis empírico llegamos a la conclusión, que a nivel micro las investigadoras jóvenes reciben menos apoyo intelectual y psicológico de sus mentores que sus homólogos masculinos.

Palabras clave: mujeres en la ciencia, la igualdad de género, jóvenes investigadores, mentor de apoyo

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INTRODUCTION

Women are still often dispriviliged in everyday scientific practice. In describing this situation it could also be said that the position of women in science is best described by the phrase »glass ceiling«. The phrase refers to the invisible barriers that limit the career advancement of women, especially at top levels of science. Despite the fact that in recent years women increasingly enter academic science, a lot of them still have to accept subordinate professional status. In the paper, the focus of our interest is whether women are also under-represented and dispriviliged in earlier phases of their scientific careers, especially in the PhD phase. To explore this issue, we use the case from Slovenia. The paper, first gives a brief conceptual overview about gender inequality in science. In the second part the paper brings some practical analysis. The subjects of empirical survey are two basic issues: recruitment of young female researchers in doctoral training programme and mentor's support to PhD students. Both issues are closely associated. It is practically impossible to separate them if we like to come to the adequate understanding of the issue of gender inequality in the earlier phases of a scientific career.

The first focus of our research interest is whether the share of recruited young female researchers is in balance with the share of recruited male young researchers in Slovenia. Namely, in Slovenia is from 1985 onwards running The Young Research Programme that is financially supported by the state. The launching of the programme was a strategic decision of R&D policy decision-makers with the aim to rejuvenate research personnel, to educate highly skilled R&D personnel, and to promote PhD study. Being aware of the importance of following the long-range trends regarding the recruitment of young female researchers in this programme, in the first part of our empirical analysis the extensive overview of available statistical data from 1985 onwards broken down by sex has been made. Namely, the tendency to discuss gender inequality as being inevitable is not rare and it is rooted in the ignorance of available official statistical data. The field of science is no exception. Here, the main focus of our empirical analysis is directed to the issue of the gender distribution of PhDs enrolled in the Young Researcher Programme. Additional interest is given to the gender distribution of mentors of doctoral students. Because the gender discrimination in the recruitment process of PhDs often starts already at the undergraduate level of study, the first part of empirical analysis is ended with the critical overview of gender structure of students in tertiary education in Slovenia. Drawing attention on the above numbered types of statistical data is essential to come to the suitable assessment, if state policy in Slovenia in the last two decades has succeeded to follow more progressive strategy concerning gender inequalities. Namely, gender inequalities are often produced and reproduced already on the level of state policy. A state can use a various institutional mechanisms to increase the percentage of female scientists.

The second focus of our research interest is the role of mentors in sponsoring, guiding and developing of PhD students. Doctoral period is one of the most important parts of professional career of every scientist. We sought to explore whether there are any significant differences in the assessments of male and female PhD students concerning their mentor's support. In our extensive empirical survey, the longitudinal approach has been used. The surveys among PhD students have been made in two time periods: in year 2004 and in year 2007, i.e. when they already finished their doctoral training. The analytical framework used in the empirical survey in year 2004 helped us to define the main groups of attitudinal variables concerning the relationship of PhD students with their mentors. In follow-up empirical survey in year 2007 three dimensions according to gender and two basic field of research (natural/technical science and social/humanistic science) have been investigated: the supervisor's intellectual encouragement; the supervisor's (psychological) support and help; and the supervisor's readiness to give research freedom to doctoral students.

WOMEN IN THEIR EARLY SCIENTIFIC CAREERS

In classical sociological theories, science is both characterised as the most universalistic of institutions and debated as an institution in which universalistic standards are slowly faltering. As a precept of science, the idea of universalism assumes that scientists should be fairly evaluated for their contributions to the body of scientific knowledge. This is summarised Robert Merton's phrase that "careers should be open to talent" (Merton, 1973: 272). The idea of particularism, in contrast, assumes the use of functionally irrelevant characteristics, such as gender and youth, as a basis for rewards in the institutional system of science. Despite the ideology of universalism, science is neither an exception nor a special case regarding the general pattern of discrimination based on sex. Many analyses of the stratification of science have shown a contradiction between the classical sociological norm of universalism and the position of women in science. Women are still often particularly discriminated against in practice. Even more, as argued by some critics of sociological normativism in science the assumption of universalistic norms in science has blinded many scientists from facing up to the persistent gender inequalities in their profession (Etzkowitz et al., 2008; Fox, 2005; Cole, 1979). The research work on universalism and particularism in science initiated by Merton has exposed the importance of cumulative advantage in science. Merton called this phenomenon the Matthew effect (Merton, 1973: 439). Cumulative advantage involves processes in science by which initial advantages, however obtained, are used to gain a further advantage. Conversely, cumulative disadvantage reinforces initial disadvantages. The Matthew effect may be especially important for understanding the lower positions of women in science through their professional careers.

Women are dispriviliged especially in the higher levels of a scientific career. Recent EU reports on women scientists conclude that men are three times more likely to reach a senior academic position than women. Regardless of the fact that in the past two decades the percentage of women students at the university graduate level has exceeded the percentage of men (they represent more than 50% of EU students and achieve 43% of EU doctoral degrees), the number of women at the highest stages of an academic career is still significantly low. Figures at the European level show that only 15% of full professors in universities are women (in 2004 for the EU-25); moreover, they are also under-represented in most decision-making positions (see: Mapping the Maze: Getting More Women to the Top in Research, European Commission, 2008: 3). The overall percentage of women in all academic positions is slightly higher (36%). However, they remain underrepresented as members of scientific boards in almost all European countries (see: Mapping the Maze: Getting More Women to the Top in Research, European Commission, 2008: 5). The position of women in science is best illustrated as a “science ladder”: on the highest level of hierarchy the proportion of women decreases (see: Benchmarking Policy Measures for Gender Equality in Science, 2008). The issue of women in science and their positions is often connected with the phrase »glass ceiling«. As it was already said, it refers to the invisible barriers that limit the career advancement of women and implies that “gender disadvantages are stronger at the top of the hierarchy than at lower levels” (Cotter et al., 2001: 655). The term was coined as a metaphor for patterns of discrimination in the business sector, yet it also applies well to the academic environment since the rate of the advancement of women is significantly lower than that of men with comparable ability and training. Various barriers (societal, professional, organisational and institutional) are believed to influence the career advancement of female academics. Another possible obstacle for women in academia is connected with family life and motherhood since they work in an environment with traditionally masculine practices and values. Advancement in academic institutions requires attention over a long period. If women decide to interrupt their career during their early child-rearing period they contravene academic expectations for sustained attention; it is believed that they cannot devote the same amount of time to academic work as men (see: Bain and Cummings, 2000: 498). However, some empirical studies show that being childless does not necessarily produce positive results in terms of career mobility (see, for example: Third European Report on Science&Technology Indicators, 2003: 266-267).

The importance of larger inclusion of women in scientific activities at all levels is apparent also in considerable efforts of EU R&D policy makers to rejuvenate research personnel and to attract more young people into scientific career, especially women, since the data on age structure of human resources in S&T shows some worrying figures.

In Slovenia, the age structure of scientists is quite good. It is better than in some very good scientifically and technologically developed countries in the EU. Data from 2006 show that the share of human resources employed in Science and Technology Occupations (HRSTO) represented almost one-third (more accurately 31%) of the total employed population in the European Union. Around 25% of them were in the 50-64 age group. The shares of this »senior« group on the national level fluctuate between 34% and 19% (with around 21% Slovenia is at the bottom of the scale) (see: Statistics in Focus: Human Resources employed in Science and Technology Occupations, 2008). Considering somewhat different age groups – also presented in statistical data – Slovenia has 37% of highly qualified S&T workers in the 45-64 age group compared to around 42% in the 25-34 age group (Science and Technology: Data on Human Resources in Science and Technology, 2008).

In Europe, since the Lisbon Strategy was accepted there has been a big policy challenge of how to increase human resources in science and technology. The need to substantially boost the number of young people in Europe entering science careers is continuously stressed.[1] The plan of the EU is to expand the proportions of

[1] According to the OECD's *Frascati Manual* (2002), human resources in science and technology comprise people who have successfully completed education at the third level in an S&T field of study and also people who, although not formally

researchers in the labour force from 5.4 per 1,000 in 2004 to 8 per 1,000 by 2010. To put this in absolute numbers, this means an additional supply of around 700,000 full-time equivalents until 2010. Namely, in 2004 the number of full-time equivalent (FTE) researchers per 1,000 labour force was just 5.4 in the EU compared to 10.1 in Japan and 9 in the USA (Key Figures, 2007).

It seems that for many EU countries another significant problem is the increasing delays seen in a researcher's age of receiving an academic promotion. To be clear: there is no "magic path" to the knowledge required on the research frontier, even in a very narrow specialty. It takes a long time to prepare to arrive at the position of a good scientist. The PhD degree certifies the successful outcome of several years of research and study. There is no substitute for personnel experiences of creating and presenting doctoral work. These characteristics also cannot be done way with in times of changing the conditions of how science functions: in these times of the emergence of "academic capitalism".

Young people in Europe do not want to enter the scientific profession because of the very risky career path in science. Finally, the scientific track can be tortuous: doctorates, post-doctorates, grants and temporary contracts, promises of permanent posts, uncertainty about which direction to take, stiff competition, the constant search for funds, and projects which ultimately lead nowhere. Other factors making scientific jobs unattractive may include the very rigid systems for promotion in a scientific career.[2] Of course, there are several reasons for the drop in interest of young people for research jobs. Let us list some of them: the already mentioned perceived lack of career possibilities in science, the growing complexity of science, the still unattractive image of the scientist in public in contrast to the attractiveness of other more profitable and high-status professions, the low level of public understanding of S&T etc.

Here, it is necessary to add that the processes of the socialisation and enculturation of young researchers represent a crucial aspect of what constitutes the whole scientific enterprise. Long-term success in a scientific career is likely to be based on attitudes and work practices established early on in one's academic career. Especially in the PhD stage, various forms of interaction between newcomers and "insiders," e.g. more experienced members (peers, supervisors etc.) play an important role. Delamont and Atkinson say that PhD students undergo a process in which they make the transition from apprentices to mature scientists who are able to carry out, confidently and competently, the 'work' of scientific research from conceptualisation to publication (Delamont and Atkinson, 2001). V. Mangematin and S. Robin also ascertain: "Like the Roman God Janus, PhDs have two faces: they are producing science and they are disseminating scientific results and know-how" (Mangematin and Robin, 2003:405).

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qualified in this way, are employed in an S&T occupation where such qualification is normally required. In the context of this definition, reference to human resources in science and technology includes PhD candidates as well.

[2] Let us take the example of the Habilitationsschrift in some continental EU member states. Of course, if we regard Habilitationsschrift as the ticket for entry to an academic scientific career. Usually, the Habilitationsschrift is obtained very late (not until the age of 40).

The set of conditions in which the processes of the professional socialisation and enculturation of young researchers is performed can be observed at different levels. They are usually grouped into three main categories: macro, meso, micro levels. The macro level includes national (transnational) factors such as governmental R&D policy. The meso level comprises the atmosphere at research institutions. The micro level is made up of research groups or work teams (see: Hemlin, Allwood, Martin, 2004).

If we look at micro level, control over work goals and procedures is often exercised more through the old-fashioned model of apprenticeships than through employment hierarchies. According to some sociologists of science, the processes of socialisation and academic enculturation of young researchers can be described in certain important respects as a 'craft' (see, for example: Ravetz, 1971; Whitley, 1984). In craft decisions, where, how and when specific tasks are carried out is largely decided by the work crew on the basis of skills acquired during apprenticeships. There are two basic modes in which doctoral students are becoming socialised in research work: in the positional mode of socialisation, the role and status of PhDs is fairly fixed. PhDs appear with a typical status of apprentices who gain more freedom and autonomy as the training proceeds. In the personal model of socialisation, PhDs work much more independently even though they more or less frequently meet with their supervisors. From the very beginning there are good chances that they will be treated as young colleagues rather than as apprentices.

In the context of the early phases of the professional socialisation and enculturation of young scientists, the role of supervisor is often described as a kind of mentorship. The meaning of the word mentor is connected with the sponsoring, guiding and developing of a younger person (Ehrich et al., 2004). In the academic setting having a mentor often involves a great advantage for professional development at all stages of one’s scientific career. Mentorship provides a “relationship context from which junior researchers can develop professionally and participate fully in the scientific community” (Nolan, 1992: 267). Therefore, young researchers need the great support of their mentor and need a role model to become a successful and independent researcher. The role of a good mentor is very important. A good mentor can help PhD students develop the beginning of a well-rounded CV, a list of useful contacts and set of strategies for professional advancement. Training in general scientific skills is part of the PhD student stage. A great deal of research socialisation consists of tacit knowledge, which is acquired by training. Such skills are best acquired in training and less easily through formal teaching. As noted by Sven Hemlin, “….in this task, mentors fulfil an important role as guides and models for creativity to doctoral students and junior researchers” (Hemlin, 2006:89).

Nobel laureate economist Paul Samuelson summarised his view on the importance of mentors in the creative development of young researchers in the following way: »I can tell you how to get a Nobel prize….to have great teachers« (Samuelson, 1972: 155). A study by Harriet Zuckerman of 92 Nobel laureates who had worked in the United States and received their prizes between 1901 and 1972 strongly suggested the crucial role of mentoring in scientific creativity (Zuckerman, 1967). According to this study, Nobel laureates are often trained by Nobel laureates and other members of the »scientific elite«. Zuckerman uses the term »social inbreeding« to describe

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the statistics that more than half (48) of the 92 prize recipients worked as graduate students, post-doctorates or junior collaborators under other Nobel laureates.

To go back to the issue of the young people's lack of interest in a scientific job, it could be said that the unbalanced age structure of researchers might represent a serious problem for Europe. Last but not least, as is declared in all of the European Commission's basic documents it is expected that a sufficient supply of high-educated S&T workforce is the main condition for creating a new European knowledge society. The document "*EU Commission Communication: Better careers and more mobility. A European partnership for Researchers*" (2008) stresses that the EU has to conceptualise a series of actions: good, well-remunerated, attractive careers in the public sector and academia need to be put in place and marketed as such to future generations. This is the main condition if the entire European Research Area (ERA) and knowledge-based economy is to be fully realized. It is absolutely key to the future prosperity and competitiveness of Europe.

In addition, the newest EU strategic document entitled The Green Paper (2007) deals with the question of how to deepen and widen the European Research Area so that it fully contributes to the renewed Lisbon Strategy: a key challenge for Europe is how to train and attract more competent researchers. As this EU document says, today most researchers in Europe still find their opportunities are curtailed by institutional and national boundaries, poor working conditions and narrow career prospects. Transparent competition for recruitment is the exception rather than the rule. That is why so many European graduates and doctorate holders either move away from research careers or pursue research in countries where they find better opportunities – mainly in the USA.

At the same time, women remain under-represented among both researchers and doctoral students, particularly in certain fields of science and engineering and – as mentioned before -in positions of responsibility.[3]

Although female participation in science has increased in recent decades, the under-representation of women in top university and research positions (professorship or other high-level research positions) represents a waste of talent and unexploited potential. This is the case even in traditionally more feminine fields of science (the social sciences and the humanities). According to the European Commission document *Women in Science: Excellence and Innovation – Gender Equality in Science* (2005) – regarding the progress made in upgrading the participation of women in science – it will be difficult to attain the Barcelona objective if women do not pursue scientific careers and if they are not stimulated to increase their participation in science, technology and

[3] Women only made up 29% of those employed as scientists and engineers in 2004, and the growth rate in their participation between 1998 and 2004 was lower than that of men (see She Figures, 2006). Other differences are similarly pronounced: only 18% of researchers in the business and enterprise sector are women, even though this is the largest R&D sector in most countries, and the one that will need to provide two-thirds of the finance to meet the EU target of 3% of GDP devoted to R&D by 2010. In particular, their participation is dramatically low in certain branches of the natural sciences and in engineering and technology, which are key R&D areas. Women are also seriously under-represented in the business enterprise sector where the EU's R&D is most highly intensive; and in senior academic grades and influential positions where strategies are set, policies are developed, and the agenda for the future is determined.

innovation. Since R&D represents a crucial sector for the EU's economic development the issue of women's under-representation in science has become important for enhancing European competitiveness and innovation potential (see: Benchmarking Policy Measures for Gender Equality in Science, 2008: 7).

The issue of women in science needs to take different factors into account, for example the work environment, competition, mobility requirements, family responsibilities, stereotypes etc. The position of women in science reflects social and cultural conditions of their role in society. Working in science is a relatively non-traditional role. Therefore, females face several obstacles which derive from the broader institutional and cultural environment. Despite formal equality, women in science often encounter hidden discrimination. "Women in a male dominated environment lack the benefits of colleague relationships and collaboration, which include intellectual stimulation and encouragement. This effects their research productivity" (Bagilhole, 1993: 269).

Given the situation described above women are viewed as a major unexploited resource for R&D in the EU. We are talking about the so-called "European paradox" with regard to the availability of human capital in R&D. Namely, on one hand the EU's goal is to increase the most skilled researchers in accordance with the ambitious development strategy to transform Europe into the most competitive global knowledge-based economy. On the other, at present we still have an unsatisfactory situation in terms of the recruitment of women in science. This situation could be overcome by different (research, higher education, employment etc.) policies. As is also stated in different EU strategic documents, policy actions undertaken at transnational or national levels in order to promote gender equality in science could contribute to two key objectives: (1) to avoid the unaffordable waste of human resources in science; and (2) to boost wider society's confidence in science.

The situation of women in science in Slovenia does not differ significantly from the situation in other European countries. Although the issue of gender equality is codified in Slovenian legislative documents (the existing equal opportunity legal framework was completed according to the EU's gender equality strategy and requirements) and key decision makers in the field of R&D are aware of this fact, the position of women in science is still biased. Past empirical surveys reveal some obstacles to women in obtaining a scientific career such as hidden discrimination, a lack of support in the work organisation, prejudices about women, overburdening with family work etc. (see: Jogan, 2006).

Are women also under-represented and dispriviliged at lower levels of their scientific careers? What is the situation of female PhDs as regards being dispriviliged? To explore this issue we will use some cases from Slovenia.

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THE "YOUNG RESEARCHER PROGRAMME" IN SLOVENIA AND THE ISSUE OF GENDER DISCRIMINATION

As mentioned, the age structure of scientists in Slovenia is quite good, unlike in some very well developed R&D countries. To a certain degree, this is a result of the Young Research Programme. The Young Researcher Programme is an organised governmental action to give financial support to PhDs and it has allowed Slovenian R&D policy actors to succeed in infusing fresh blood into the country's R&D human resources. Due to the large diversity of research structures among EU countries, it is difficult to compare different systems of governmental support for PhDs and post-docs. Notwithstanding this, it seems that during the last few years Slovenia has gone a step further than many developed countries with its Young Researcher Programme. In many developed countries, the importance of the organised recruitment of new PhDs was not recognised until a few years ago. Let us only mention some of the success stories. In Norway, all doctoral candidates receive a subsidy or a grant from their university. In Ireland, anyone working towards a PhD is considered a student and receives money from the government or is sponsored by companies. Money is rarely an obstacle for the best PhD students. The *Ramón y Cajal* programme in Spain is targeted at improving the "academic career prospects" and employment opportunities of PhDs in the public research sector. This policy programme has attracted a lot of attention from professional journals such as Nature and Science (see: Cruz-Castro and Sanz-Menéndez, 2005). The various strategies differ in their focus, nature and outcomes.

The Slovenian Young Researcher Programme was launched in 1985 on the initiative of the Slovenian Academy of Sciences and Arts. From the outset the main goal has been to:

- provide new research and research-teaching staff in research organisations;

- increase the research capacity of groups carrying out programmes, basic, applied and research development projects;

- to promote postgraduate education and training in general; and

- to enhance R&D human potential for the business-enterprise sector and other users (public institutions).

At the beginning of this action, it was planned that young researchers should undergo research training and education for a period of a few months to up to 6 years. After a few years, the period of training and employment (another benefits of the programme is the employment of a young researcher in a research institution) was shortened. Today, young researchers are employed for a specified period: 2.5 years until their master's degree, 2.5 years until their doctoral degree, 4 years of integral doctoral studies, and 3 years of doctoral studies abroad.

Since the beginning, the action has attracted the significant interest of graduates. In fact, more than 300 graduates per year were engaged in the first years of the governmental programme of financial support for young

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researchers. A significant drop in numbers was seen only in the following years: 1991, 1996 and 2001. The reason was the considerable reduction in funds allocated to the programme. After 2002 the level of financing again gradually rose. The number of new entrants has stabilised at around 250 per year. The action has contributed to lowering the average age of researchers by more than 5 years. In total, 6,268 young researchers have been included in the programme over a period of 23 years (see Table 1).

TABLE 1: Number of all young researchers accepted in the programme from 1985 to 2008 (source: Slovenian Agency for Science)

Year	Number of young researchers	**Year**	Number of young researchers	**Year**	Number of young researchers
1985	94	**1993**	244	**2001**	4
1986	433	**1994**	278	**2002**	241
1987	497	**1995**	210	**2003**	424
1988	383	**1996**	185	**2004**	256
1989	375	**1997**	225	**2005**	258
1990	307	**1998**	248	**2006**	239
1991	199	**1999**	220	**2007**	248
1992	179	**2000**	271	**2008**	250

SUM 1985-2008: 6268

Let us list some advantages and disadvantages of the Young Researcher Programme in Slovenia. The advantages include the following successes:

1. Throughout the whole transitional period the policy action created good incentives for young people to take up a research career. In the time of the transition, it was important for young people to have a chance to acquire stable forms of financing during their doctoral studies and thereafter to have better chances of finding employment in their profession.

2. As a small transitional country with a small scientific community Slovenia was able to maintain the core of its human resources in science and technology. Under the programme Slovenia had a constant flow of young research potential, even in times of uncertainty of the science system and the brain-drain

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phenomenon seen at the beginning of the 1990s. Slovenia's brain drain in the transitional period can be estimated as negligible (see: Mali, 2003).

3. PhD candidates in the framework of the Young Researcher Programme do not hold the status of a fellowship. They are included in research groups within the mentor's institutions. This probably provides an explanation of why the failure rate of PhDs is quite low.

4. In the last two years, the Slovenian Agency for Science established more standardised procedures for the selection of senior researchers who can take on the role of mentors or supervisors of PhDs.[4] More standardised criteria are also used in the selection of PhD candidates.[5] Inbreeding in the selection process is thereby being reduced. At the same time, information and reputation in the labour market of researchers have improved.

And what are disadvantages of the Young Researcher Programme as governmental support for the recruitment of PhDs? The chief disadvantage of the Young Researcher Programme is that the goal of enhancing the inter-sectoral mobility of young researchers has not been realised. From the beginning, one of the main goals of the programme was to increase the mobility of scientists (after finishing their PhDs) from academic institutions to industry. This goal has largely remained unrealised. Only a few of those with a PhD degree have entered industrial R&D departments. In total, about 60% have remained in academic research institutions (75% of all PhDs), about 20% have joined the business sector (10% of all PhDs) and a similar number have continued their career in the public administration (15% of all PhDs). Researchers who have finished a PhD in Slovenia are still more concentrated in the public sector. This lies in contrast to the basic objectives of the Lisbon Strategy.

A disadvantage of the Young Researcher Programme is that women as mentors are underrepresented. In the Rules on the Training and Financing of Young Researchers in Research Organisations some quotas are given for the list of selected mentors. For example, to create a balance between scientific fields the expert bodies of the Agency for Science prepare priority lists of mentors taking the professional background of supervisors into account. According to the rules, 25% of the mentors on the mentor list for every single discipline must be at least

[4] The evaluation criteria to select mentors are mainly based on scientific records such as: (1) assessed number of scientific articles published in the last five years; (2) scientific impact of published works (citations); (3) linking research work with users; (4) approved international projects etc. Additional criteria for evaluating mentor candidates are: (1) linking the research work of the mentor candidate with domestic and foreign users; (2) relevance of the proposed training programme for the young researcher and its connection with the planned postgraduate studies; (3) previous mentoring success of the mentor candidate (see, for example: Rules on the Training and Financing of Young Researchers in Research Organisations, 2008).

[5]In addition, the candidates for young researchers are submitted to specific selection criteria. The basic criteria for admission to the PhD training programme are: (1) an average study grade of at least 8 at the undergraduate level; (2) as a rule, being aged up to 28; (3) to be either a citizen of the Republic of Slovenia or a foreign citizen with the right to education on the same conditions as a citizen of the Republic of Slovenia, and (4) to at least have a university-level education.

younger than 45 years. Unfortunately, quotas with regard to the gender structure are not set out. The data (see Table 2) show that in the last five years women as mentors are underrepresented: only about a quarter of all PhDs' mentors in the last five years have been women. One of the reasons is a general lack of women scientists with the required position demanded in a call for applications for a PhD mentor. This is a crucial aspect of "vertical functional segregation" (Jogan, 2006: 153), where the proportion of women with high academic titles decreases.

TABLE 2: The percentage of women mentors for PhDs from 2004 to 2008

Year	**% of women mentors of PhDs**
2004	29.8
2005	24.7
2006	26.8
2007	29.0
2008	25.7

The gender distribution of PhDs enrolled in the Young Researcher Programme in Slovenia is also out of balance.[6] In 1986, 20% of MSc students were women. In 1990, the percentage of women in the whole population of MSc students had already risen to 35.6. The number of successful PhD students grew more slowly, but in 1996 among all PhDs 36.2% were women. The number is moving ever closer to their male colleagues. Notwithstanding this, more male researchers than female researchers have always been included in the programme. This means that young researcher positions are still dominated by men. This is confirmed by data for the whole 23-year period (see Table 3). We have to take another additional factor into consideration: although the share of young female researchers is slowly approaching the share of young male researchers (overall 41.77% of women were included in a programme), it is not necessary that they will stay and work in science after the end of their training period.

[6] As noted by a report prepared by the National Committee on Enhancement of the Role of Women in Science (NCERWS) in Slovenia (see: Family in Science – Slovenian Way, 2008), the social/health security associated with the status of PhDs also significantly encouraged women to enrol in the Young Researcher Programme.

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TABLE 3: Gender structure of young researchers in the 1985-2008 period by fields science (source: Slovenian Agency for Science)

Fields of science	Natural sciences		Engineering		Medicine		Biotechnology		Social sciences		Humanities		Interdisciplinary research		SUM				
Year/ Sex	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M		W		Sum
	count	count	Count	count	count	count	count	count	count	count	count	count	count	count	count	percent	count	percent	Count
1985	12	9	26	6	4	4	9	5	3	4	5	7			59	62,77	35	37,23	94
1986	73	55	154	39	14	13	21	12	13	20	13	6			288	66,51	145	33,49	433
1987	61	42	179	59	14	17	30	35	23	17	13	7			320	64,39	177	35,61	497
1988	49	42	123	45	17	13	28	24	8	10	8	16			233	60,84	150	39,16	383
1989	35	35	133	40	8	14	27	36	11	14	9	13			223	59,47	152	40,53	375
1990	32	42	87	28	11	8	27	25	16	10	12	9			185	60,26	122	39,74	307
1991	19	18	65	19	8	10	8	12	11	9	13	7			124	62,31	75	37,69	199
1992	15	21	50	16	7	14	19	16	5	3	5	8			101	56,42	78	43,58	179
1993	23	30	72	21	9	12	4	11	20	17	8	17			136	55,74	108	44,26	244
1994	28	34	84	27	3	13	17	17	13	19	9	14			154	55,40	124	44,60	278
1995	25	20	63	13	10	16	7	17	12	11	5	11			122	58,10	88	41,90	210
1996	22	23	46	7	6	14	9	11	9	18	8	12			100	54,05	85	45,95	185
1997	34	28	64	14	10	18	7	12	10	11	5	12			130	57,78	95	42,22	225
1998	30	35	66	17	10	15	5	18	14	14	11	13			136	54,84	112	45,16	248
1999	32	24	64	12	6	17	9	14	9	11	13	9			133	60,45	87	39,55	220
2000	37	30	71	17	8	23	12	12	16	13	8	23	0	1	152	56,09	119	43,91	271
2001							0	1	1	0	0	2			1	25,00	3	75,00	4
2002	29	31	53	23	9	19	8	19	14	10	15	11			128	53,11	113	46,89	241
2003	69	47	113	26	12	27	14	30	14	29	17	26			239	56,37	185	43,63	424
2004	38	32	69	16	7	15	6	17	11	17	10	18			141	55,08	115	44,92	256
2005	38	33	65	15	15	14	10	17	12	13	5	21			145	56,20	113	43,80	258
2006	42	27	53	19	7	18	10	16	9	13	11	11	1	2	133	55,65	106	44,35	239
2007	40	35	54	22	4	15	9	22	11	10	11	15			129	52,02	119	47,98	248
2008	38	41	58	18	5	7	11	20	13	11	12	13	1	2	138	55,20	112	44,80	250
Sum	821	734	1812	519	204	336	307	419	278	304	226	301	2	5	3650	58,23	2618	41,77	**6268**
Sum %	52,80	47,20	77,73	22,27	37,78	62,22	42,29	57,71	47,77	52,23	42,88	57,12	28,57	71,43					
Sum m+w	1555		2331		540		726		582		527		7						

Legend M - men, W – women

As Table 3 shows, over the whole period the highest share of women was found in medicine (62.22%), biotechnology (57.71%) and humanities (57.12%). Interdisciplinary research is rather new field of science therefore we can not interpret the data in the context of the whole programme.. Over the whole period, the lowest share of women was seen in engineering. It is evident that, besides the "traditional" interest of female PhDs in the medicine, humanities and social sciences, biotechnology is becoming an important area of their research interest. The growing share of female PhDs in the field of biotechnology in Slovenia may be viewed as very positive. Namely, if it was once feared that information and communication technologies would create a disadvantage for women in the labour market, then bio- and life-sciences might provide them with an advantage as these two fields are very popular with women. These new trends are also shown in other parts of the world (see, for example: Mahroum, 2007). Can we say that – to use the words of Etzkowitz et al. – the "coming gender revolution in science" (Etzkowitz et al., 2008: 403) is only transcending the traditional sexual separation of labour in Slovenia in the new arising sciences? [7]

Of course, the gender structure of young scientists in Slovenia does not fully explain the R&D human resources policy in Slovenia. Namely, it depends on many other factors. Last but not least, the act of 'recruitment' of young people for research training is not the first step to lead to a more balanced gender structure in science. In effect, gender discrimination in the recruitment process often already starts at the undergraduate level of study where the choice of subjects for the baccalaureate qualification often keeps open or closes off the option of women to undertake a subsequent scientific career. This option is reinforced (or denied) through the successive stages of education and training. Undergraduate education creates the main recruitment pool for young scientists. When thinking about the issues of recruiting young people for R&D activities, it is important to include information about the gender structure of participants in tertiary education since the decision on study reflects divided social roles. For instance, various figures for EU countries indicate that there are scientific fields where women are scarcely present (engineering, in particular), and others where they occasionally form the majority, such as in the medical sciences (see, for example: Third European Report on Science&Technology Indicators, 2003).

Taking the situation in Slovenia into account, data from the Statistical Office of the Republic of Slovenia show that in the last few years more females than males have enrolled in the first year of undergraduate study (in the 2007-2008 academic year 57% of females). Most female students are interested in the study programmes of

[7] In recent times, biotechnology has been increasingly becoming part of new arising converging technologies. Converging technologies represent a new phase in the development of science and technology that results from the integration of nanotechnology, biotechnology, information and communication technology (ICT), and cognitive sciences. The notion of converging technologies may be described as a combination of enabling scientific discoveries (biogenetics, nanoscience), techniques (informatics, gene splicing), and advances in allied tools (computing power, scanning tunnelling microscopes, robotics) that greatly accelerate the basic science involved and their practical applications across a breathtaking range of subjects, from human health to materials science (see, for example: Bainbridge and Roco, 2006).

social work (90%), teacher education and journalism (80%), health, veterinary and the humanities (70%). On the other hand, most male students are enrolled in study programmes of computing and engineering (90%), while in other areas of studies (services, agriculture) the proportions of males and females are not so different.

Regarding the procedures for recruiting young female researchers in Slovenia, some new policy approaches are needed to improve the situation. Among the many possible instruments at least the following should be mentioned: the abolition of formally existing obstacles to a woman's academic career such as higher age-limits for women to be enrolled in the Young Researcher Programme, the upgrading of expectations regarding (only) the women's academic career and the organised support of the actual parenthood of women and men in academic positions (e.g. childcare facilities etc.), and the creation and dissemination of female role models.

THE ROLE OF MENTORS IN SUPPORTING YOUNG RESEARCHERS IN SLOVENIA – DOES ANY SORT OF GENDER DISCRIMINATION EXIST?

The extent to which the creative potential of young researchers is expressed depends considerably on the micro environment in which the individual young researchers work.[8]

Excellent scientific achievements need not only rely on psychological factors (individual motivation) but also arise in professional interaction within the micro social context. Or, as Katarina Prpič put it: "The contribution of professional activity of young scientists largely depends on the social organisation of science as well as their position in research group, participation in scientific work, engagement in routine or more demanding research tasks and opportunities to (co)write conference papers" (Prpic, 2004: 23).

Certainly, the typical scientific career trajectory differs from discipline to discipline. But the professional relationship between the mentor and the doctoral student is almost invariably important. Long-term success in a scientific career is likely to be based on attitudes and work practices established early on in one's academic career. Although the benefits of mentorship are not gender-specific, the mentoring relationship becomes important for young women researchers since the male-dominated academic environment can be truly harsh for them. Despite the equal opportunity policies of research institutions, academic scientific community is particularly perceived as "traditionally elitist, male and patriarchal in its workplace culture, structure and values"

[8] The set of conditions in which the processes of the professional socialisation and enculturation of young researchers is performed can be observed at different levels. They are usually grouped into three main categories: macro, meso, micro levels. The macro level includes national (transnational) factors such as governmental R&D policy. The meso level comprises the atmosphere at research institutions. The micro level is made up of research groups or work teams (see: Hemlin, Allwood, Martin, 2004).

(Poole et al., 1997: 373). In such an environment women scientists often remain confronted by discrimination based on gender inequality. In recent times, academic institutions have been undergoing a radical change which could be succinctly characterised as the emergence of "academic capitalism". The key elements of this change in academia are stronger demands for efficiency, engagement in commercial activities, growing competition for external funding etc. All of these changes sometimes even exacerbate the position of young women in science because they are reflected in the changing of employment conditions, organizational "pressure" to produce applied scientific results etc.

As stated above, one of the reasons why women are under-represented and dispriviliged is – partially because of traditionally higher presentation of men in science – the fact that they receive little support from their mentors, which is also the subject of verification in our empirical research. Lower support that women encounter at the beginning of their academic career is averting them from reaching higher academicals achievements.

In 2004, an empirical study was conducted at the Faculty of Social Sciences of the University of Ljubljana with the aim to explore the micro-social environment of young researchers and to study how it affects their research and scientific efficiency. [9]

Sample

All of 236 young researchers that were enrolled in 2004 in the third year of PhD studies, along with their mentors were invited to collaborate in interviews. The first step was to contact mentors and gain their consent to conduct personal interviews with them. 204 responded. Through these interviews, we were able to acquire basic data about young researchers and their colleagues in the research group. Following this, the same respondents were asked to fill a questionnaire published on the internet. All together 117 answers from young researchers were significant for purposes of our analysis. This made the response rate 55.9 percent. At the end of 2007, follow-up empirical research was conducted on the same pattern of respondents, e.g. former young researchers who had already finished their training period. With regard to 2004 the level of responses was lower: 48.3%. Both surveys were conducted through internet.

Figure 1 presents the structure of respondents in terms of their gender, age, job status (after finishing their PhD) and discipline-related status.

[9] The principle investigator of the whole project in 2004 was Prof. Dr. Anuska Ferligoj. In the paper, the results of the whole analysis in 2004 are not discussed. Here, we would like to only mention that the research work from 2004 at large approved that mentors with their scientific quality and excellence represent an ideal for young researchers (Ferligoj et al., 2007).

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FIGURE 1: GENDER, EMPLOYMENT AND DISCIPLINE-RELATED STRUCTURE OF RESPONDENTS

		1st wave		2nd wave	
		Count	Percent	Count	Percent
Gender	Male	71	60,7	34	59,6
	Female	46	39,3	23	40,4
Employment	the same department of faculty/institute			29	50,9
	the other department of faculty/institute			1	1,8
	the other faculty			2	3,5
	non-academic sphere			10	17,5
	Unemployed			1	1,8
	Other			3	5,3
	young researcher			2	3,5
	n.a			9	15,8
Research field	Natural/technical science	89	75,4	44	77,1
	social/humanistic science	23	19,5	12	20,8
	Other	6	5,1	1	2,1
Total		118	100,0	57	100,0

Figure 1 shows us that the structure of respondents in both researches is similar. Three quarters of respondents is active on natural/technical science field. The result of this fact is prevalent male population in the sample (around 60%). In our empirical research, the majority of researchers who had finished their PhD thesis had stayed in the same department of the research institution where the training took place. These figures confirm the official statements that the greatest deficiency of the Young Researcher Programme in Slovenia is the lack of inter-sectoral mobility of young scientists.

Data and measures

One of the main subjects of the survey in year 2007 was to investigate the role of mentor. Part of the questionnaire was the same in both surveys. This enables us to compare the results between the two surveys. To improve reliability of the measurement instrument, in the last survey some items were added.

The analytical framework used in the empirical research in 2004 helped us to define the main groups of attitudinal variables concerning the relationship of PhD students with their supervisors. In our follow-up empirical research from 2007, we sought to explore whether there were any significant differences in the assessments of male and female PhD students concerning their mentor's support. We measured three dimensions according to gender and field of research: the supervisor's intellectual encouragement; the supervisor's (psychological) support and help; and the supervisor's readiness to give research freedom to doctoral students. These three dimensions were computed as an average value of corresponding items. The answers were requested on 7-point Likert scale from 1 'fully disagree' to 7 'fully agree'. The scale was reverted if the item had negative connotation (marked with 'R').

Methods

Bivariate analyses provided the insight into the differences between men and women. For that purpose, the Independent t-test was used. For testing reliability of the dimensions, Cronbach apha was used. In order to compare the results of the two researches, we computed dimensions from average values of estimated statements that were used in both researches and we tested them with Paired Samples t-test. From data of our last survey, we computed new dimensions and used additional items to improve reliability. Due to small samples in both surveys we paid attention on the differences between the average values, which are significant at level 0,1.

1. The first dimension: intellectual encouragement

A PhD contributes not only to scientific and technical training (to learn how to perform an experiment, how to design and write scientific texts) but also to the discovery of the rules and codes of different working communities, primarily the academic scientific community. Supervisors can exert a considerable influence by encouraging their candidates to create new scientific networks at home and abroad. The supervisor's support for young researchers to visit scientific conferences is very important. It is not uncommon to mention that the first conference presentation was a turning point in the professional careers of young researchers. Delivering a paper to an audience of interested scholars brought them several positive rewards. Attending conferences, particularly those that that are small and specialised, allowed PhD students to network, exchange ideas and develop professional ties. This sort of networking is very important for pursuing later research careers.

To measure the dimension of "the supervisor's intellectual encouragement" of PhD students, in our research work from 2003 and 2007 we used the following items:

- My supervisor encouraged me to attend conferences; and

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- My supervisor encouraged me to take educational courses abroad;

TABLE 4: INTELLECTUAL ENCOURAGEMENT BY SUPERVISOR (descriptive statistics and t-test)

			My supervisor encouraged me to attend conferences	My supervisor encouraged me to take educational courses abroad	Dimension intellectual encouragement
2003	Cronbach alpha				*0,70*
	Total sample (N=115)	Mean	5,35	4,61	4,98
		Std. Deviation	1,87	2,01	1,70
	Male (N=70)	Mean	5,61	4,63	5,12
		Std. Deviation	1,76	1,95	1,58
	Female (N=45)	Mean	4,93	4,58	4,76
		Std. Deviation	1,98	2,12	1,88
	t-test		1,925	0,132	1,085
	sig.		0,057	0,895	0,262
2007	Cronbach alpha				*0,80*
	Total sample (N=57)	Mean	5,20	4,40	4,80
		Std. Deviation	1,93	2,14	1,86
	Male (N=34)	Mean	5,63	4,74	5,18
		Std. Deviation	1,75	2,06	1,71
	Female (N=23)	Mean	4,57	3,89	4,23
		Std. Deviation	2,05	2,19	1,96
	t-test		2,11	1,48	1,95
	sig.		**0,04**	0,145	0,056
Comparision 03/07	t-test		1,23	2,83	2,44
	sig.		0,22	**0,01**	**0,02**

Although we used only two items for this dimension, the measure of reliability computed by Cronbach's alpha was assessed at 0,70 in the first wave and 0,80 in the second wave, which indicates that the set of items measures this dimension quite well. Comparing the mean values of the items in both surveys, we conclude that students are more encouraged by their mentors in attending conferences than in taking educational courses abroad. The mean level of agreement is a higher than the middle value of the scale.

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To test the differences in mean values between males and females concerning their supervisor's intellectual encouragement, we applied Independent t-test. In both surveys the statement "My supervisor encouraged me to attend conferences" was estimated higher by males. In the year 2003, the difference between genders was little above the level of statistical significance. In year 2007 when former young researchers estimated mentors encouragement with bigger critical distance, the difference increased. The statement in research from 2007 "My supervisor encouraged me to attend conferences" was again estimated higher by males. It seems that females in Slovenia have less support from their supervisors than males for becoming involved in the broader scientific network (through attendances at conferences, encouragement to take educational courses abroad etc.). Differences between genders in dimensions estimation *intellectual encouragement* can only be confirmed through results of research from year 2007.

Based on Paired samples t-test we can confirm that the statements "My supervisor encouraged me to take educational courses abroad" and the dimension *intellectual encouragement* are estimated higher in research from year 2007. It is possible that young researchers with concluded PhD studies remember mentors encouragement more optimistically.

Further on we were interested in existence of differences between genders in estimation of mentors encouragement within particular research field. Due to small sample especially in the last research, we formed only two groups of research fields: natural/technical science and social/humanistic science. Note, that only 14 young researchers active in the field of social/humanistic science collaborated in this research and therefore the t-test does not contain reliable, but merely illustrative survey of results.

A detailed analysis proved that the difference in the estimated dimension between males and females is much higher in the natural/technical sciences than in social/humanistic sciences, as it has proved in both researches. A possible explanation of the result – as a consequence of the fact that the natural sciences are traditionally more represented by males – is that male students are treated as being more competent by their mentors than their female colleagues.

The survey from 2003 has showed that mentor's intellectual encouragement was estimated better by males both on natural/technical and social/humanistic field, but the differences are higher on natural/technical field and are statistically proved. Men are more encouraged especially in case of attending conferences. Survey in 2007 shows similar results.

TABLE 5: INTELLECTUAL ENCOURAGEMENT BY SUPERVISOR ACCORDING TO FIELD OF STUDY (descriptive statistics and t-test)

				My supervisor encouraged me to attend conferences	My supervisor encouraged me to take educational courses abroad	Dimension 'Intellectual encouragement'
2003	natural/technical science	Total sample (N=85)	Mean	6,04	4,85	5,45
			Std. Deviation	1,49	1,90	1,44
		Male (N=55)	Mean	4,87	4,40	4,63
			Std. Deviation	1,93	2,09	1,81
		Female (N=30)	Mean	5,62	4,69	5,16
			Std. Deviation	1,74	1,97	1,62
		t-test		2,89	1,02	2,27
		sig.		**0,01**	0,31	**0,04**
	social/humanistic science	Total sample (N=30)	Mean	4,07	3,80	3,93
			Std. Deviation	1,87	1,97	1,55
		Male (N=15)	Mean	5,07	4,93	5,00
			Std. Deviation	2,15	2,19	2,04
		Female (N=15)	Mean	4,57	4,37	4,47
			Std. Deviation	2,05	2,13	1,86
		t-test		-1,36	-1,49	-1,61
		sig.		0,19	0,15	0,12
2007	natural/technical science	Total sample (N=43)	Mean	5,82	4,80	5,31
			Std. Deviation	1,62	2,05	1,66
		Male (N=30)	Mean	3,85	3,62	3,73
			Std. Deviation	2,01	2,11	1,89
		Female (N=13)	Mean	5,22	4,44	4,83
			Std. Deviation	1,95	2,12	1,86
		t-test		3,41	1,72	2,75
		sig.		**0,00**	**0,09**	**0,01**
	social/humanistic science	Total sample (N=14)	Mean	4,25	4,25	4,25
			Std. Deviation	2,36	2,36	2,02
		Male (N=4)	Mean	5,50	4,25	4,88
			Std. Deviation	1,76	2,35	1,96
		Female (N=10)	Mean	5,14	4,25	4,70
			Std. Deviation	1,95	2,26	1,92
		t-test		-1,09	0,00	-0,54
		sig.		0,30	1,00	0,60

2. The second dimension: the supervisor's help and support

The career pathway of young researchers is challenging and difficult. Nearly everyone at one point or another confronts the existential question of whether they want to drop out or continue. Several challenges emerge as being key to PhD students' success in progressing along their path careers. Mentors not only provide young PhD students intellectual encouragement, but other sorts of support as well. In the psycho-social sphere, mentors offer a role model, counselling, confirmation and friendship, which help young researchers develop a sense of professional identity and competence. In providing these functions, good mentors gain technical and psychological support. In some sense, they enable their younger colleagues to learn how to "navigate" in the world of science.

To measure the dimension "the supervisor's help and support" for PhD students in our researches work from 2003 and 2007 we used the following items:

- I think my supervisor was a very helpful person;
- My supervisor always gave me advice concerning the development of my PhD project;
- My supervisor helped me prepare my publications and
- My supervisor leaves me to my own devices (reverted).

In survey 2007, three additional items were used for this dimension:

- My supervisor gave me some extra time and attention concerning the development of my PhD project;
- My supervisor taught me informal rules of scientific work and
- My supervisor often showed me parental interest for my academic career.

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TABLE 6: THE SUPERVISOR'S HELP AND SUPPORT (descriptive statistics and t-test)

		I think my supervisor was a very helpful person	My supervisor always gave me advice concerning the development of my PhD project	My supervisor helped me prepare my publications	(R) My supervisor leaves me to my own devices	My sup. gave me some extra time and attention concerning the dev. of my PhD project	My supervisor taught me informal rules of scientific work	My supervisor often showed me parental interest for my academic career	Dimension The supervisor's help and support (comp. 03/07)	Dimension The supervisor's help and support (07)
Cronbach alpha									*0,73*	
Total sample (N=115)	Mean	5,62	5,29	4,90	2,70				4,70	
	Std. Deviation	1,54	1,78	1,99	1,80				1,48	
Male (N=70)	Mean	5,84	5,16	4,81	2,53				4,44	
	Std. Deviation	1,35	1,91	2,00	1,68				1,22	
Female (N=45)	Mean	5,27	5,49	5,02	2,87				4,45	
	Std. Deviation	1,75	1,55	1,99	1,96				1,28	
t-test		1,88	-0,98	-0,55	0,5				-0,04	
sig.		**0,06**	0,33	0,59	0,62				0,97	
Cronbach alpha									*0,82*	*0,89*
Total sample (N=57)	Mean	6,03	5,46	4,72	2,88	4,78	4,97	4,19	3,83	3,44
	Std. Deviation	1,24	1,76	1,94	1,53	1,75	1,82	1,82	1,84	2,17
Male (N=34)	Mean	5,50	5,04	4,50	3,30	4,41	4,50	4,09	4,00	3,64
	Std. Deviation	1,90	2,02	2,01	1,80	2,18	1,83	1,84	1,68	2,04
Female (N=23)	Mean	5,82	5,29	4,63	3,05	4,63	4,78	4,15	3,58	3,14
	Std. Deviation	1,54	1,86	1,95	1,64	1,92	1,82	1,81	2,08	2,38
t-test		1,18	0,82	0,42	-0,95	0,70	0,96	0,21	0,83	0,85
sig.		0,25	0,42	0,68	0,35	0,49	0,34	0,83	0,41	0,40
t-test (07:03)		-0,13	1,18	2,40	-1,51				2,4	
sig.		0,90	0,24	0,20	0,14				**0,03**	

The Cronbach alpha, which indicates the level of reliability, in survey 2003 amounts 0,73, in survey 2007 using the same items comes up to 0,82, with additional items even to 0,89. The students agreed strongly that their supervisor was a very helpful person. Similarly young researchers in both questionnaires agreed with the item "My supervisor always gave me advice concerning the development of my PhD project". Most items were estimated lower but above the middle value of the scale. Paired Sample t test shows difference between first and second research only with the item "My supervisor helped me prepare my publications", which was estimated higher in research from 2003 ($t=2,4$, $p<0,05$). We may conclude that the students were generally quite satisfied with their supervisor's help and support.

To test the differences in mean values between males and females concerning supervisor's help and support, we applied Independent t-test. Differences between genders appear to be only in research from year 2003, with item "I think my supervisor was a very helpful person". Males agreed with this item more than females ($p<0,1$). It

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seems that young female scientists again have less support from their supervisors in Slovenia than is the case of young male scientists. In research from year 2007 no such differences can be confirmed with any item. The dimension 'The supervisors help and support' is estimated in the first wave significantly higher than in the second wave (p<0,05).

TABLE 7: THE SUPERVISOR'S HELP AND SUPPORT ACCORDING TO FIELD OF STUDY (descriptive statistics and t-test)

				I think my supervisor was a very helpful person	My supervisor always gave me advice concerning the development of my PhD project	My supervisor helped me prepare my publications	(R) My supervisor leaves me to my own devices	My sup. gave me some extra time and attention concerning the dev. of my PhD project	My supervisor taught me informal rules of scientific work	My supervisor often showed me parental interest for my academic career	Dimension The supervisor's help and support (comp. 03/07)	Dimension The supervisor's help and support (07)
2003	natural/technical science	Total sample (N=85)	Mean	5,65	5,42	5,31	2,39				4,69	
			Std. Deviation	1,61	1,66	1,77	1,46				1,24	
		Male (N=55)	Mean	5,91	5,40	5,31	2,40				4,75	
			Std. Deviation	1,44	1,79	1,80	1,52				1,24	
		Female (N=30)	Mean	5,17	5,47	5,30	2,37				4,57	
			Std. Deviation	1,80	1,41	1,73	1,38				1,26	
		t-test		2,07	-0,19	0,02	0,10				0,64	
		sig.		**0,04**	0,85	0,99	0,92				0,53	
	social/humanistic science	Total sample (N=30)	Mean	5,53	4,90	3,73	2,39				4,58	
			Std. Deviation	1,33	2,06	2,15	1,46				1,18	
		Male (N=15)	Mean	5,60	4,27	3,00	2,53				3,72	
			Std. Deviation	0,91	2,12	1,60	1,68				1,14	
		Female (N=15)	Mean	5,47	5,53	4,47	2,87				4,43	
			Std. Deviation	1,69	1,85	2,42	1,96				1,46	
		t-test		0,27	-1,75	-1,96	-0,50				-1,43	
		sig.		0,79	**0,09**	**0,06**	0,62				0,16	
2007	natural/technical science	Total sample (N=43)	Mean	5,77	5,42	4,88	3,00	4,66	4,91	4,17	3,77	3,34
			Std. Deviation	1,55	1,74	1,79	1,69	1,95	1,76	1,75	1,85	2,16
		Male (N=30)	Mean	6,08	5,62	5,02	2,90	4,93	5,08	4,22	4,03	3,65
			Std. Deviation	1,25	1,58	1,70	1,58	1,78	1,80	1,81	1,72	2,08
		Female (N=13)	Mean	5,04	4,96	4,58	3,23	4,04	4,50	4,08	3,16	2,62
			Std. Deviation	1,95	2,06	2,01	1,96	2,25	1,66	1,68	2,06	2,25
		t-test		2,12	1,14	0,74	-0,59	1,40	1,00	0,24	1,46	1,44
		sig.		**0,04**	0,26	0,47	0,56	0,17	0,32	0,81	0,15	0,16
	social/humanistic science	Total sample (N=14)	Mean	5,96	4,89	3,86	3,21	4,54	4,39	4,07	4,01	3,74
			Std. Deviation	1,57	2,22	2,27	1,54	1,92	2,03	2,06	1,89	2,27
		Male (N=4)	Mean	5,63	4,25	2,50	2,75	3,63	4,13	4,00	3,71	3,55
			Std. Deviation	1,25	2,75	2,38	1,26	1,11	2,02	2,16	1,50	1,99
		Female (N=10)	Mean	6,10	5,15	4,40	3,40	4,90	4,50	4,10	4,13	3,81
			Std. Deviation	1,73	2,08	2,11	1,66	2,09	2,13	2,13	2,09	2,47
		t-test		-0,50	-0,67	-1,48	-0,70	-1,14	-0,30	-0,08	-0,36	-0,19
		sig.		0,63	0,52	0,17	0,50	0,28	0,77	0,94	0,73	0,85

Figure shows the comparison of average values of item- and dimension- estimation between men and women within working field. Research from year 2003 reveals that within natural/technical field of work, men agree more with item "I think my supervisor was a very helpful person", whereas in social/humanistic field no

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differences between genders can be confirmed. On the contrary, women within social/humanistic field have agreed more with items "My supervisor always gave me advice concerning the development of my PhD project" and "My supervisor helped me prepare my publications". The difference between genders is less reliable ($p<0,1$). Research from year 2007 indicates only one difference between genders within natural/technical field of work; men have rated item "I think my supervisor was a very helpful person" better than women ($p<0,1$). Social/humanistic field of work shows no differences.

3. The third dimension: the readiness of supervisors to allow freedom of research

Doctoral research work takes place within a controlled intellectual and work environment. But freedom of research is also very important for young researchers. Last but not least, it can also be an indicator of the confidence of the supervisor in the doctoral student. It is very important that the supervisor gives enough freedom to the PhD student to prepare their thesis while advising and helping the student to do the thesis and to prepare its publication. Freedom versus control is probably the tension most directly tied to creativity *per se*. Sven Hemlin says that it is clear that work autonomy is important for proactivity and innovation behaviours in the research workplace. But a certain amount of challenge and necessity is also beneficial for proactivity and innovation. This is often a typical feature of the scientific academic working field where competition to be successful is intensified (see: Hemlin, 2006: 87). To generalise, freedom of research is often named as a basic characteristic of good research units, frequently in addition to a loose organisational structure (Pelz and Andrews,1966).

To measure the dimension "freedom of research" by PhD students in 2003 the following items were used in our empirical research:

- R My supervisor imposed his/her own opinion all too often;
- R My supervisor determined the course of my research concerning my PhD in too much detail and
- 'My supervisor gave me enough freedom concerning the content of my PhD.

TABLE 8: THE READINESS OF SUPERVISORS TO ALLOW FREEDOM OF RESEARCH OF STUDY (descriptive statistics and t-test)

			R My supervisor imposed his/her own opinion all too often	R My supervisor determined the course of my research concerning my PhD in too much detail	My supervisor gave me enough freedom concerning the content of my PhD	Dimension Readines of supervisors to allow freedom of research
2003	Cronbach alpha					*0,78*
	Total sample (N=115)	Mean	5,40	5,89	5,98	5,76
		Std. Deviation	1,68	1,33	1,31	1,21
	Male (N=70)	Mean	5,50	5,83	6,21	5,85
		Std. Deviation	1,53	1,40	1,03	1,16
	Female (N=45)	Mean	5,24	5,98	5,62	5,61
		Std. Deviation	1,90	1,22	1,60	1,29
	t-test		0,76	-0,59	2,20	1,01
	sig.		0,45	0,56	**0,03**	0,32
2007	Cronbach alpha					*0,77*
	Total sample (N=57)	Mean	5,54	5,79	6,12	5,82
		Std. Deviation	1,60	1,54	1,40	1,25
	Male (N=34)	Mean	5,46	5,74	6,29	5,83
		Std. Deviation	1,68	1,63	1,26	1,22
	Female (N=23)	Mean	5,65	5,87	5,87	5,80
		Std. Deviation	1,51	1,42	1,58	1,32
	t-test		-0,45	-0,32	1,13	0,09
	sig.		0,65	0,75	0,26	0,93
Comparison 03/07	t-test		-1,09	-1,88	-0,24	-1,55
	sig.		0,28	**0,07**	0,81	0,13

The reliability of the measure instrument, measured with Cronbach's alpha was good – in the first wave 0,78 and in the second 0,77. The level with agreement with the items was quite high. The agreement was the highest with the statement 'My supervisor gave me enough freedom concerning the content of my PhD' in both surveys.

In the first survey, the item 'My supervisor gave me enough freedom concerning the content of my PhD' was significantly higher estimated by males (p<0,05). In the second survey, males were less agreed with the statement 'R My supervisor determined the course of my research concerning my PhD in too much detail' (p<0,1).

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TABLE 9: THE READINESS OF SUPERVISORS TO ALLOW FREEDOM OF RESEARCH OF STUDY (descriptive statistics and t-test)

				R My supervisor imposed his/her own opinion all too often	R My supervisor determined the course of my research concerning my PhD in too much detail	My supervisor gave me enough freedom concerning the content of my PhD	Dimension Readines of supervisors to allow freedom of research
2003	natural/technical science	Total sample (N=85)	Mean	5,42	5,91	5,98	5,77
			Std. Deviation	1,63	1,32	1,27	1,16
		Male (N=55)	Mean	5,62	5,87	6,27	5,92
			Std. Deviation	1,47	1,39	0,97	1,14
		Female (N=30)	Mean	5,07	5,97	5,43	5,49
			Std. Deviation	1,86	1,22	1,57	1,15
		t-test		1,41	-0,31	3,05	1,66
		sig.		0,17	0,76	**0,00**	0,10
	social/humanistic science	Total sample (N=30)	Mean	5,33	5,83	6,00	5,72
			Std. Deviation	1,84	1,37	1,44	1,37
		Male (N=15)	Mean	5,07	5,67	6,00	5,58
			Std. Deviation	1,71	1,50	1,25	1,20
		Female (N=15)	Mean	5,60	6,00	6,00	5,87
			Std. Deviation	1,99	1,25	1,65	1,55
		t-test		-0,79	-0,66	0,00	-0,57
		sig.		0,44	0,51	1,00	0,57
2007	natural/technical science	Total sample (N=43)	Mean	5,26	5,60	6,00	5,62
			Std. Deviation	1,70	1,66	1,52	1,33
		Male (N=30)	Mean	5,35	5,67	6,23	5,75
			Std. Deviation	1,73	1,70	1,32	1,26
		Female (N=13)	Mean	5,04	5,46	5,46	5,32
			Std. Deviation	1,68	1,60	1,85	1,48
		t-test		0,55	0,37	1,56	0,97
		sig.		0,59	0,71	0,13	0,34
	social/humanistic science	Total sample (N=14)	Mean	6,39	6,36	6,50	6,42
			Std. Deviation	0,79	0,93	0,85	0,71
		Male (N=4)	Mean	6,25	6,25	6,75	6,42
			Std. Deviation	0,96	0,96	0,50	0,57
		Female (N=10)	Mean	6,45	6,40	6,40	6,42
			Std. Deviation	0,76	0,97	0,97	0,78
		t-test		-0,42	-0,26	0,68	0,00
		sig.		0,69	0,80	0,51	1,00

A detailed analysis of survey 2003 proved that the difference in the estimated item 'My supervisor gave me enough freedom concerning the content of my PhD' between males and females is proved only in the natural/technical sciences. Males were more agreed with this statement then women ($p<0,05$).

CONCLUSION

In our paper, we have explored two basic issues: recruitment of young female researchers in doctoral training programme and mentor's support to PhD students. To explore those issues, we used the case from Slovenia. Our starting point in the article was that women in most European countries are still under-represented and dispriviliged. This is a great disadvantage for Europe since the acceptance of Lisbon Strategy in year 2000 stimulated a big R&D policy challenge in all European countries of how to increase human personnel in science and technology. As it is declared in all other EU basic strategic policy documents it is expected that a sufficient supply of high-educated R&D workforce is the main condition for creating a new European knowledge society. The need to substantially boost the number of high qualified young people in Europe entering science careers is continuously stressed. Unfortunately, there exist a lot of reasons which have been leading to the drop in interest of young people for research jobs. In the first part of the paper, some of these reasons have been analyzed. However, we are meeting with "European paradox" with regard to the availability of R&D personnel. Namely, on the one hand the goal of Europe is to increase the number of the most skilled researchers in accordance with its ambitious development strategy. On the other, at present we still have an unsatisfactory situation in terms of the recruitment of high educated personnel in research job. Therefore, getting more women in scientific profession remains one of the biggest challenges for R&D policy actors in all European countries.

In the empirical part of our paper, our aim was to show that Slovenia is confronting with the same kind of challenges in R&D policy as all other European countries. It is true that Slovenia is becoming with the long-running Young Researcher Programme one of the most successful countries in Europe in terms of improving the age structure of its R&D human potential. Our thesis in the paper was that during the last few years Slovenia has gone a step further than many developed countries in Europe with organized governmental support for PhD students. Notwithstanding this, there have been revealed some crucial disadvantages of this R&D policy action. The Young Research Programme has not succeeded in improving the gender structure of young researchers. Namely, our empirical analysis of available statistical data for the whole 23-year period showed that more males than females have been recruited in PhD study. The lowest share of young female researchers was seen in the field of engineering. In the paper, we have tried to explain the main reasons for this unbalanced gender structure of PhD students in some scientific fields.

The goal of our empirical research was not only the critical benchmarking of data related to "entering quoatas" in PhD programs. To complement and enrich our knowledge about the position of women in the earlier phases of their scientific careers we have also observed the "working climate" of young female researchers at so-called micro level. Namely, if we look at micro level, the professional relationship between the mentor and the doctoral student is very important. With the help of extensive longitudinal empirical survey (questionnaires among PhD students at the beginning of their study in year 2003 and after end of their study in year 2007), we come to the conclusion that young female researchers receive less intellectual and psychological support from their mentors than their male counterparts. Our starting-point hypothesis that the women are under-represented and dispriviliged in the PhD phase of a scientific career have been approved also in the case of Slovenia.

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