

GENDERED CAREER PATHS IN ENGINEERING AND TECHNOLOGY IN CROSS-NATIONAL AND WEST-EAST PERSPECTIVE

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Abstract

Science today, perhaps more than ever, is the site of multiple negotiations. Market values increasingly drive scientific research and higher education yet the traditional emphasis upon rational knowledge remains. The range of actors with a claim to ‘have a say’ in science has also grown to include a range of voices beyond academe, from industry, government and the public. These new actors may play different roles in different contexts and geopolitical spaces. All these processes also have a gender dimension – from recruitment and retention of scientists and employees career paths, to excellence, work-life balance and the gendering of knowledge production processes and practices.

The historical rupture produced by state-socialism and the subsequent process of EU enlargement and the impending introduction of policy measures to promote gender equality in science in the new EU member states create an ideal vantage point to conduct a comparative study into knowledge-production processes, including possible exclusions, in East Central and Western Europe. Aiming to investigate the complex interactions among national and regional contexts, hegemonic discourses, institutional practices with respect to gender the proposed research was guided both by a genealogical inquiry elaborated in the tradition of “hegemonic institution” of Michel Foucault and by a social epistemological framework.

This publication is devoted to highlight the problems of women meet in their engineering and technologies research careers discovered in project “PROMETEA: Empowering Women Engineers in Industrial and Academic Research” and to share information aimed at promoting gender equality, for male and female careers in national science policy and West-East perspective context.

In my analysis, I reject the rigid interpretation of current situation of post Communist democratization policy by postcolonial approach in women’s engineering and technological research careers, applied to post Socialist countries as Lithuania – new ES accession country. Different women research groups from Eastern European are regularly constituted as others in periphery, minority, inadequate or undeveloped, less paid, but well working, who need help and acceptance from center, from dominant majority (Western)

researchers’ excellent groups. Democratization made space for new ideas, including gender equality and Western influence, with attendant democratization and debates about gender equality, might have made space for greater egalitarianism in post Communist democratization policy in Eastern Europe.

The study indicate that women in E&T research are on average more egalitarian than are men, and that these differences are persistent across national contexts. All men directly or indirectly benefit from gender inequality, getting better access to power, prestige and material resources, and thus they are more likely to favor maintaining traditional family roles that increase women’s dependence. Women are more likely to support egalitarian gender roles because it is in their interest to increase their own economic resources and gain career in research sector.

Common problems in all countries revealed: under representation of women in sciences and research, high under-representation of women in exact sciences and technologies, a large gender disproportion in the highest academic and scientific management levels, bigger average salaries for men researchers in comparison to women researchers, no evidence for improvement of this situation. Gender imbalance on all levels of S&T organizations significantly restrains the count from reaching the Lisbon Strategy goals

Women-researchers’ possibilities to realize self-potentials and their talents independently and creatively are considerably more restricted than men’s in all fields of professional activities in S&T by such structural barriers as access to organizational positions and to influential social networks, and overall, to human material resources.

Women researchers are placed in disadvantageous position by dominance of strong traditional patriarchal gender order in the societies in general and, in particular, in S&T.

The unequal women’s condition in everyday situations undermines principles of gender equality, which is a fundamental right, a common value of the European Union (EU, hereinafter), and a necessary condition for the achievement of the EU objectives of growth, employment and social cohesion.

Keywords: gendered career paths, engineering and technologies research, gender equality and East-West dynamics.

1. Introduction

Science today, perhaps more than ever, is the site of multiple negotiations. Market values increasingly drive scientific research and higher education, yet the traditional emphasis upon rational knowledge remains. The range of actors with a claim to ‘have a say’ in science has also grown to include a range of voices beyond academe, from industry, government and the public. These new actors may play different roles in different contexts and geopolitical spaces. All these processes also have a gender dimension – from recruitment and retention of scientists and employees career paths, to excellence, work-life balance and the gendering of knowledge production processes and practices.

The theorists have drawn attention to historically changing relations of power in which knowledge production is situated, the importance of epistemic communities and cultures for the generation of knowledge, the possibility of epistemic privilege of those oppressed in terms of insights into relations of power and oppressive practices, and the necessity for epistemic negotiations across multiply configured discursive spaces of the social-political world.

These critical streams of thought have, however, developed mostly in western Euro-American contexts while traditional assumptions of knowledge production were left largely unexamined in the formerly socialist countries¹. Whereas a range of topics of feminist research, such as women’s political participation, the public and the private, and gender and nationalism, have been researched by Central and Eastern European scholars, the issue of knowledge production contexts appears to be almost untouched issue (see Duhaček 2000). While the amount of research carried out in this field varies, translations of the works of theorists from “Western” countries, as well as biographical approaches to “add women into the picture” have been the dominant practices². To date there are few examples of local examinations of the production of contexts and cultures of knowledge production, particularly in the new EU members states, but also in some of the old ones. As a result, measures to promote gender equality in research and development, as well as the inclusion of young people in science,

have remained only partially effective. Beginning with the Report “Rising Tide: A Report on Women in Science, Engineering and Technology” (OST 1994) and continuing to the present, many UK government reports, for example, have been released indicating a lack of women in science and yet action on the recommendations of these results is still to show fruition (Greenfield 2002; UK Office of Science and Technology 2003). In Central and Eastern Europe, where support measures, instruments and schemes will be launched based on Western experiences, these measures risk being introduced in a complete vacuum of local examinations of the production of knowledge. The recent ENWISE report (European Communities 2004b) on the situation of women scientists in Central and Eastern Europe underlines this particular development regarding, for example, the relatively high status of women scientists within societies that otherwise espouse traditional gender arrangements. The fact that gender bias and forms of exclusion and marginalisation of women and young people in science may assume different forms in different cultures is largely ignored.

The historical rupture produced by state-socialism and the subsequent process of EU enlargement and the impending introduction of policy measures to promote gender equality in science in the new EU member states create an ideal vantage point to conduct a comparative study into knowledge-production processes, including possible exclusions, in East Central and Western Europe. Aiming to investigate the complex interactions among national and regional contexts, hegemonic discourses, institutional practices with respect to gender, the proposed research was guided both by a genealogical inquiry elaborated in the tradition of Michel Foucault and by a social epistemological framework.

For nearly twenty years Eastern Europe and the Baltic States as well have been moving from a developed socialism and “planned economy” to a postmodern world and a postmodernist conception of the world and industry. Public gender equality system became more modern, but private system (family, personal life) is very traditional. The high figures of women employment in E&T³ research sphere is the heritage of mentality, attitudes and needs of post socialist (post communist, post totalitarian) countries. To achieve unified emancipation, legal equality between men and women was introduced; women were encouraged to work outside the home, to take equality of opportunity in education and private life. The gender equality model through sameness (equal opportuni-

¹ Before 1989, for example, sociology was regarded with a lot of suspicion as a pseudo-bourgeois science without relevance to socialist societies. Philosophy, on the other hand, was under the direct rule of the single paradigm of Marxism-Leninism and was fashioned to fit post-war developments.

² Examples for prominent translations are Nagl-Docekalová, Herta et al: *Štyri pohľady do feministickéj filozofie*, Bratislava 1994 or *ASPEKT 1/1998 Myslenie žien*, a biographical approach is followed e.g. in *Slovenská národná knižnica: Lexikon slovenských žien*, Bratislava 2004.

³ E&T – Engineering and Technology.

ties or equal treatment) in sense, male norms as the standards, was used. Traditional equal opportunities policies were limited because they mean that women can only gain equality with men if they are able to perform to the standards set by men. The governments of the Baltic States have made a clear political choice by selecting an expert-bureaucratic model against participatory-democratic model (both definitions by Beveridge et al 2000), for implementing gender equality policies and gender mainstreaming as a part of human development and democratization, performed by specialists, civil servants. The expert-bureaucratic model reflects the 'integrationist' approach to gender mainstreaming. The 'integrationist' approach was kindly adapted to the Baltic conditions as a legitimate premise for marginalizing those stakeholders with an 'agenda-setting' approach as women's advocacy and feminist/gender researchers. The short time to possess a highly developed understanding of gender equality policies and gender-sensitive policy instruments forced the marginalization, diversification and segregation for different social groups of women. The question of gender equality as a part of democracy was not (or very weakly) raised. The matter there is not deep tradition of feminism in Post-Soviet countries. There was the institutionalization of Women/Gender Studies in 1990's as a reflection of intention to be in the mainstream of world's humanities.

At the same time the growing involvement into EU research programs allowed better understanding of the gender issues in engineering and technology research in Lithuania and in all Baltic States as well. **This publication is devoted to highlight the problems women face in their E&T research careers** discovered in project "PROMETEA: Empowering Women Engineers in Industrial and Academic Research" (STREP), in sub-program "*Science and Society*" in the area "*Women and Science*") **and to share information aimed at promoting gender equality for male and female careers in national science policy and West-East perspective context.** Research project funded by the European Commission in the 6th Framework Programme: "Structuring the European Research Area, Science and Society, area: Women and Science". **The aim** of research project PROMETEA was **to develop a better understanding of gender issues in engineering and technology research settings, in order to propose effective measures and recommendations to empower women engineers' careers in academic and industrial research in Europe.** The **common objective** was to gain the ability to promote a diverse and creative research sector, which is a key issue in the European and in national research policies as well

as in Lithuania for the technological and economical sustainable development. Viewing the Consortium we have to highlight that all partners brought together expertise which was applied in each specific country. A smaller set brought expertise in methodology; comparative and empirical research was developed further and used in all work tasks from information gathering to its analysis and interpretation. National teams from 13 countries ensured the cultural diversity and enhanced the chances of validating our study at the European level. The diversity of Europe was presented in the consortium with partners from **Northern Europe (Finland, Lithuania, and Sweden), Southern Europe (Greece, Spain), Central Europe (Germany, Austria and Slovakia) and Western Europe (France and United Kingdom).** Serbia has good chances to join the EU one day, Russia complements the Eastern Europe description and the issue of post-communist countries, the comparison with Slovakia and Lithuania now in EU was fruitful. They all are post totalitarian⁴, post communist countries with different development. Chile brought an overseas perspective, from a developed country with deep European roots in Latin America

The **objective** in context of Lithuania is the following: analytical East-West comparison as an international comparative study which we supposed to summarise and analyse the findings of the national research studies and provided a narrow international comparison which looked into the impact of gender and recent histories in the countries involved on the production of knowledge.

⁴ A dictatorial form of centralized government that regulates every aspect of state and private behaviour. Although the term was originally intended to designate fascist and communist regimes, totalitarianism is mainly associated with characterizations of the Soviet Union. Its proponents do not agree on when, if ever, the Soviet Union ceased to be totalitarian, but they tend to converge on the view that at some point the political leadership was both all powerful and totally illegitimate. For many commentators, the Soviet Union entered a new phase after the abandonment of mass terror after Stalin's death. However, others operating within the totalitarian paradigm point to institutional continuity, KGB harassment of dissidents, and the ever present possibilities of the reassertion of arbitrary state power until 1989. The total and sudden collapse of the Soviet Union since then casts doubt not only on this school, but perhaps on the whole concept of totalitarianism. In the 1970s, a new school of Sovietology emerged which pointed to evidence both for popular support for the regime and for widespread dispersion of power, at least in implementation of policy, among sectoral and regional authorities. For some of the 'pluralists', this was evidence of the ability of the regime to adapt to include new demands. However, totalitarian theorists claimed that the failure of the system to survive showed not only its inability to adapt, but also the formality of supposed popular participation. *Stephen Whitleyfield*, <http://www.answers.com/topic/totalitarianism>

2. Research methodology

The whole project from data gathering to designing the methodology tool-box to interpret the data was carried out not only in a multidisciplinary style but also in a multicultural dimension. It was here where partners from different community countries brought their own national expertise and contributed jointly to the research leading to recommendations which were expected to be applicable in several states. The iteration process planned with a quantitative phase provided feedback which was precisely where the added value was the highest: the challenge to conceive, design, build and carry out a multicultural survey in the area of gender equality in engineering education and in lifelong learning.

The structure of the project was such that the interaction of partners at every stage was essential at documentation gathering and analysis, the formulation and testing of the methodological tool-box to begin with, it was a must that all partners pay attention in practice to the culturally equivalent parameters.

Teams designed the questionnaire and sent it out to partners for testing. A similar procedure was taken with data analysis, since it is intended to run the statistical packages in more than one partner country.

There were three groups of partners: 1) core partners, which hired competent professionals of technology and gender studies, those partners were academic departments or research centers that specialize in human and social sciences, especially education, philosophy, sociology, anthropology, etc. Many of them are multidisciplinary and many of them have worked together in FP5 European projects INDECS (2001–2002) and WOMENG (2002–2005) teams; 2) associate partners, which brought to the project all the experience they have in their field, some were social scientists, others were from science and engineering. Consulting SME⁵ and an association were also partners by bringing another perspective to the project. Associated partners translated guidelines and fieldwork in their respective countries, reported on national data, bibliography, disseminated project results and recommendations to national science administration bodies; 3) corporate partners were companies interested in the subject and willing to fully share their information and experience with R&D⁶; they provided data, enabled studies of good practice as well as day to day life at the laboratories. They provided persons for focus groups and interviews. This partnership led to much deeper understanding of industrial research.

In addition to its transnational theoretical contributions, this publication aims at introducing transversal research designs, methods and methodologies by which the complex interrelationships between gender, engineering and technology research, career paths, sorts of industry, organisational cultures, are explored. The projects were carried out in 2005–2007. Recent publication will cover the exploring of gender dynamics of male and female careers in different engineering organizations by comparing different fields of engineering, academic and industrial settings, also comparing private and public organizations, innovative and traditional companies and organizations, particularly developed with examples from different countries, from different fields.

The goals set for this part of research were possible to achieve with the following methodology by prof. Christine Wachter and Anita Thaler from the Klagenfurt University (Austria). The objectives combine engineering and careers of female engineers, research activities with organizations in which these activities were done. The hypothesis put forward was that the dynamics of gender varies depending on different fields of engineering, different settings (academic and industrial) and private/public organizations. There was also a question if typologies like innovative and traditional ones can help to understand different gendered career structures better. Organizational cultures further female engineering research careers or the other way round. Positive or negative organizational cultures affect promoting or hindering of research careers for men and women. Nevertheless the hypothesis is that gender is a very prominent social factor in construction of careers in engineering research.

The development of the PROMETEA research project was to confront several transversal issues concerning both recent changes regarding research policies and practice (Bologna process, development of funding through contracts with partners, more and more interdisciplinary character of research interest, etc.) and more theoretical questions, such as choice of gender theories in relation to research on gender and E&T, definition of E&T domain, cross-comparative methodology, difference between women and technology studies and gender and technology studies, etc. What can be the impact of such questions on research hypotheses and therefore, on methodological choices and research outcomes? Do they influence the process of inclusion or exclusion of women in E&T research?

The objectives for defined gendered dynamics of engineers' careers in engineering and technology research aim at identifying the gendered dynamics of

⁵ SME – Small and medium enterprise

⁶ R&D – Research and development

engineers' careers in engineering and technology research. Career paths in traditional and non-traditional academic and industrial settings were analysed in order to gain a deeper theoretical understanding of the mechanisms, positive and negative reasons leading to careers and to career changes of women engineers in academic and industrial engineering and technology research.

Qualitative data on gender dynamics in male and female careers in academic and industrial settings of engineering and technology research were gathered through semi-structured interviews and focus groups. The guidelines were designed in a way that they also provided data for Work packages. The data were gathered in the participating countries and interpreted in the national context. The results will serve as a basis for cross-national comparisons from a cross-cultural perspective in work package. The data were compiled in a database that can be used for further research into this topic.

From the point of view of male and female engineers, we looked at positive and negative factors that have an impact on their research careers: are there gendered differences, regarding contents and context of work; corporate culture; work climate; career perspectives; supportive or hindering structures for 'work-life balance' (e.g. flexible working hours). We want to analyze the reasons why women engineers leave jobs in engineering at different stages (e.g. dissatisfaction with job contents and work climate; lack of career perspectives; working in a non-engineering position/field; problems of compatibility of job and family affairs).

Various case studies looked at the genderedness of engineering careers in academic and industrial settings (Glover, 2002, Meinholdt, Murray, 1999). One focus lies on a comparison between traditional and non-traditional settings. Another one lies on patchwork careers that cross conventional borders, e.g. women engineer researchers who at one time or another, or at the same time, work for public and private institutions, or who exit into management or become entrepreneurs themselves (Minks 2001, Olson 2002, Clarke et al. 2004).

Following the trans-national methodology of research, three steps were used. In the first step, the situation in the partner countries was investigated to find out which relevant academic and industrial research fields are to be included in the case studies. Criteria for "traditional" and "non-traditional" settings were developed. The general aim was to identify similar settings in the participating countries, to have an option for cross-national comparison. However, it turned out, that the situation in individual countries may be quite different: what may be considered as "tra-

ditional" in one case may be "non-traditional" in another. To determine operational criteria, we decided to focus on the content level: non-traditional settings deal with questions of sustainability, socially and environmentally sound technology design, user participation and integration in the design process. An example for a "traditional" paradigm can be "old" big construction companies or departments of nuclear energy, compared to "young", "innovative" companies or research institutions in the fields of sustainable building and renewable energies (Greed, 2000, Bagilhole, Dainty, Neale, 2000, Bagilhole, Dainty, Neale, 2002, Bagilhole, Dainty, Gibb, Pepper, 2003, Cross, Bagilhole, 2002, Ramdina, 1998, Verein Frau am Bau, 2003a, 2003b, Clancy, Oparaocha, Roehr, 2004, Roehr, 2002, 2004).

In the second step, qualitative data for gender career paths and career changes were gathered in semi-structured interviews and focus groups.

In the third step, the qualitative data for gender career paths in traditional and non-traditional academic and industrial settings and reasons for career changes were analysed, interpreted and compared.

The summaries in this report were based on the fieldwork summaries the project partners have provided on the PROMETEA WIKI (<http://www.prometea.info/promwiki/>) for various deliverables, in their national reports and in their entries in the database. Therefore it has to be borne in mind that in individual countries the focus may have been put on differing aspects and generalisations have to be treated with caution.

Three main hypotheses were analyzed and results from the fieldwork as represented and documented in the project database⁷ were discussed and supported with quotations that illustrate the case. Results on the genderedness of career paths were presented based on the data and interpretations provided by the partners in their National Reports⁸. The genderedness of career paths was compiled with an emphasis on country-specific results as they can be interpreted from the data collected in the National Reports of the project partners⁹.

The discussions of our main hypotheses are based on the fieldwork and database entries of all project partners. The following two tables show the samples concerning work package. The first one shows the numbers of all interviewed female and male engineers in technology research and the second one shows the numbers of interviewed female engineers in non-traditional technology research in twelve countries, which are included in the PROMETEA database

⁷ Spanish data are not included in the database.

⁸ Greek data were not available.

⁹ Greek data were not available.

Table 1: Number of all interviewed female and male engineers in technology research in twelve countries¹⁰

	Austria	Chile	Finland	France	Germany	Greece	Lithuania	Russia	Serbia	Slovakia	Sweden	UK
Interviewed female engineers	6	6	8	14	7	3	4	8	6	6	6	9
Female engineers in focus groups	8	10	10	14	7	0	7	11	6	8	7	7
Male engineers in focus groups	8	7	9	12	10	0	8	10	6	8	8	7
N = 271	22	23	27	40	24	3	19	29	18	22	21	23
Fem. = 178 (83 Interviews + 44 Focus groups)												

Table 2: Number of interviewed female engineers in non-traditional technology research in twelve countries¹¹

	Austria	Chile	Finland	France	Germany	Greece	Lithuania	Russia	Serbia	Slovakia	Sweden	UK
Interviewed female engineers	3	3	3	0	4	2	2	2	0	0	0	2
Female engineers in focus groups	3	4	10	0	4	0	3	5	0	0	0	4
N = 54	6	7	13	0	8	2	5	7	0	0	0	6

Out of 178 female engineers interviewed 54 (30.34%) work in non-traditional fields.

in Total: **24 cases**
(Spain and Greece are not included, no data could be retrieved from the database)

Total per Sector:	HES: 12	GOV: 4	BES: 8
Traditional: 16	Chile France-ENS Lithuania Russia Serbia Slovakia Sweden UK	France-ENS	Austria Finland France-Lyon Germany Serbia Sweden UK
Non-Traditional: 8	Austria Chile Finland Lithuania	Germany Germany-CEH Slovakia	Russia

50% HES	2/3 traditional 1/3 non-traditional	2/3 Academic (HES + GOV)
17% GOV	1/4 traditional 3/4 non-traditional	46 % traditional 54 % non-traditional
33% BES	3/4 traditional 1/4 non-traditional	1/3 Industrial (BES)

2/3 Traditional
1/3 Non-Traditional

¹⁰ Spanish data are not included in the database.

¹¹ Spanish data are not included in the database.

The first hypothesis is that women engineers in research working in traditional fields experience more (ambivalent) sexism than women engineers in research working in non-traditional fields.

The following methodology of this hypothesis is analysis of three relevant questions from the interviews with women engineers and from focus groups with men and women engineers from traditional engineering fields and from non-traditional engineering fields (e.g. sustainable technologies):

Interviews with women engineers:

- Has there been anything that has been hindering you in your career?
- Focus Groups with women engineers:
- Would your career be different if you were a man?
- Do you ever discuss issues related to gender in your work environment?
- Focus Groups with men engineers:
- Would your career be different if you were a woman?
- Do you ever discuss issues related to gender in your work environment?

Indication from literature for the first hypothesis: ambivalent sexism is a more subtle form of sexism where the well-known negative and hostile aspects are combined with apparently positive (so-called benevolent) aspects and both appear like two sides of one coin (Glick, Fiske, 1997). For instance, one side tells about stronger people-orientation of women, that this is so important for engineering, and therefore more women should go into the field of engineering to improve this field. The other side, however, says in a whisper that women are not so machine-oriented, not so rational and logical, and whatever it is what engineers should be to be treated as competent engineers. And just because the compliment of being people-oriented sounds nice, it cannot balance out the disadvantages of being called less machine-oriented, less logical or generally less competent, because these are the qualities which are connected to the stereotyped image of a proper engineer (Thaler, 2005b). The point is that the benevolent aspects of ambivalent sexism – seeming as compliments – go back to traditional stereotyped gender roles (Eckes, 2003). That is the reason why we think that sexism (and also the apparently moderate ambivalent sexism) more often appears in traditional engineering fields.

In the following results, relevant hindering and supportive factors for a successful career as female researcher in engineering or technology research will be summarized and illustrated with interesting quotes and relevant answers from the field work, as documented in the PROMETEA database¹². The quotes are not

always representative, but outstanding and show general issues as manifested in sexist structures and cultures in academic and industrial research.

In conclusion, hidden and open discrimination of women in engineering and technology research takes place in all sectors and in all fields. There is no obvious difference between settings in traditional and non-traditional (oriented towards sustainable technologies) areas. Even though more evidence is coming from traditional settings, it has to be taken into account that two thirds of the sample come from traditional settings thus the likelihood of more evidence is also higher.

To conclude, the following supportive factors can be mentioned as helpful for a successful career of women in engineering and technology research in academia and industry.

The second hypothesis is about traditional engineering fields the “availability-cult” is stronger than in non-traditional engineering fields.

Indication from literature for the second hypothesis: the actual working hours vary in all European countries and in Chile, but besides that, the most frequent working time arrangements differ a lot as well. The following table (European Commission 2003, p. 150) shows that the time frame ranges from 35 hours per week in France to 42 working hours per week in Slovakia. Serbia’s usual working time is also like the EU average¹³ but Chile’s time arrangement lies even above that, the regular working time is now 45 hours per week¹⁴.

Instead of the concept of presenters (Thaler, 2005a), where the focus lies on being visible at the workplace, we think that modern, flexible working styles lead to an “availability-cult”, where people have to be available or accessible (on the mobile phone and via e-mail) around the clock. We think that machine and money-oriented traditional engineering fields put their employees more under the pressure of being available all the time than people- and environment-oriented non-traditional engineering fields.

The following methodology of this hypothesis is the analysis of three relevant questions from the interviews with women engineers from traditional engineering fields comparing with those from non-traditional engineering fields (e.g. concerning sustainable technologies):

- How balanced is your work life and private life in your present job?
- What demands are put on your time and engagement? (Working beyond normal work hours? Being reachable even outside job?)

¹³ This information comes from the Serbian project partner Sanja Vranes, Scientific Director of the Mihailo Pupin Institute.

¹⁴ This information is provided in the Chilean National Report from Sonia Yañez from Centro de Estudios de la Mujer (CEM).

¹² Spanish data are not included in the database.

- What possibilities for flexibility in combining work and private life does the job offer? (How do you react to the demands? Which possibilities do you use and how?)

Table 3. The most frequent working time arrangements and working time flexibility by working time status and gender, 2001

	Full-time employees						Part-time employees					
	Men			Women			Men			Women		
	Most frequent working time	Second most frequent	Share	Most frequent working time	Second most frequent	Share	Most frequent working time	Second most frequent	Share	Most frequent working time	Second most frequent	Share
B	38h	40h	63.7	38h	40h	57.4	20h	32h	25.7	20h	19h	32.7
DK	37h	40h	67.7	37h	40h	66.0	10h	15h	25.5	30h	32h	25.7
D	40h	38h	60.0	40h	38h	62.8	20h	10h	29.9	20h	30h	34.1
EL	40h	48h	69.2	40h	48h	65.5	20h	30h	38.4	20h	30h	35.3
E	40h	38h	77.0	40h	38h	77.5	20h	25h	52.3	20h	25h	45.1
F	35h	39h	57.8	35h	39h	59.7	20h	30h	34.1	20h	30h	28.3
IRL	39h	40h	63.5	39h	40h	57.8	20h	8h	34.2	20h	24h	36.6
I	40h	36h	69.6	40h	36h	72.1	20h	40h	38.2	20h	24h	42.9
L	40h	37h	88.4	40h	20h	87.2	20h	40h	46.5	20h	30h	52.7
NL	40h	38h	70.8	36h	40h	83.0	32h	8h	29.7	32h	20h	25.4
A	40h	38h	84.9	40h	38h	84.8	20h	30h	47.1	20h	30h	52.8
P	40h	35h	76.7	40h	35h	83.9	30h	20h	39.0	20h	25h	40.9
FIN	40h	38h	72.8	38h	40h	56.8	20h	30h	32.3	30h	20h	34.0
S	40h	38h	82.3	40h	38h	80.8	20h	30h	39.2	30h	20h	38.8
UK	40h	38h	22.7	38h	40h	28.2	20h	16h	17.5	20h	16h	17.2
EU	40h	38h	48.1	40h	38h	48.7	20h	30h	24.1	20h	30h	27.6
BG	40h	48h	85.0	40h	48h	85.2	20h	25h	40.9	20h	25h	51.7
CY	38h	40h	74.4	38h	40h	69.1	25h	20h	38.0	25h	20h	47.6
CZ	40h	38h	75.6	40h	38h	78.5	30h	20h	50.2	30h	20h	48.2
EE	40h	48h	83.5	40h	48h	82.8	20h	25h	59.6	20h	30h	60.6
HU	40h	50h	85.4	40h	42h	87.1	20h	30h	65.9	20h	30h	71.7
LT	40h	48h	82.9	40h	36h	83.3	20h	30h	62.5	20h	30h	65.0
LV	40h	48h	71.1	40h	48h	69.4	20h	24h	36.2	20h	24h	34.9
PL	40h	42h	72.7	40h	42h	73.5	20h	30h	40.6	20h	30h	48.3
RO	40h	48h	87.8	40h	48h	90.0	40h	30h	45.4	40h	20h	51.8
SI	40h	50h	86.4	40h	42h	88.5	20h	30h	62.3	20h	30h	59.7
SK	42h	40h	84.1	42h	40h	84.6	20h	30h	71.5	20h	30h	57.2

Source: Eurostat, LFS, ad hoc module 2001

Notes: The shares in the table indicate the share of employees with working times according to one of the two most frequent working times

As the results of this section we presented interesting quotes and relevant answers from interviewees, they were not always representative but outstanding and showing general issue in an enlightening way. In the next section, “conclusions”, we summarize the answers and discourses of all interviews in a short but general way based on summaries (entries in our project database) done by all PROMETEA partners¹⁵.

In conclusions, one result can be obtained from statistical data. The following chart (European Commission 2003, p. 144) shows the actual overwork load per country. As it can be seen, the United Kingdom (30 % of all employees are doing overwork) and Austria (28 % overworking employees) lie above the European average (15 %) and the other countries from our study¹⁶. France also lies a little above the European average of overtime work. But there has to be considered that the most frequent time arrangements vary from country to country. The EU average most frequ-

¹⁵ Spanish data are not included in the database.

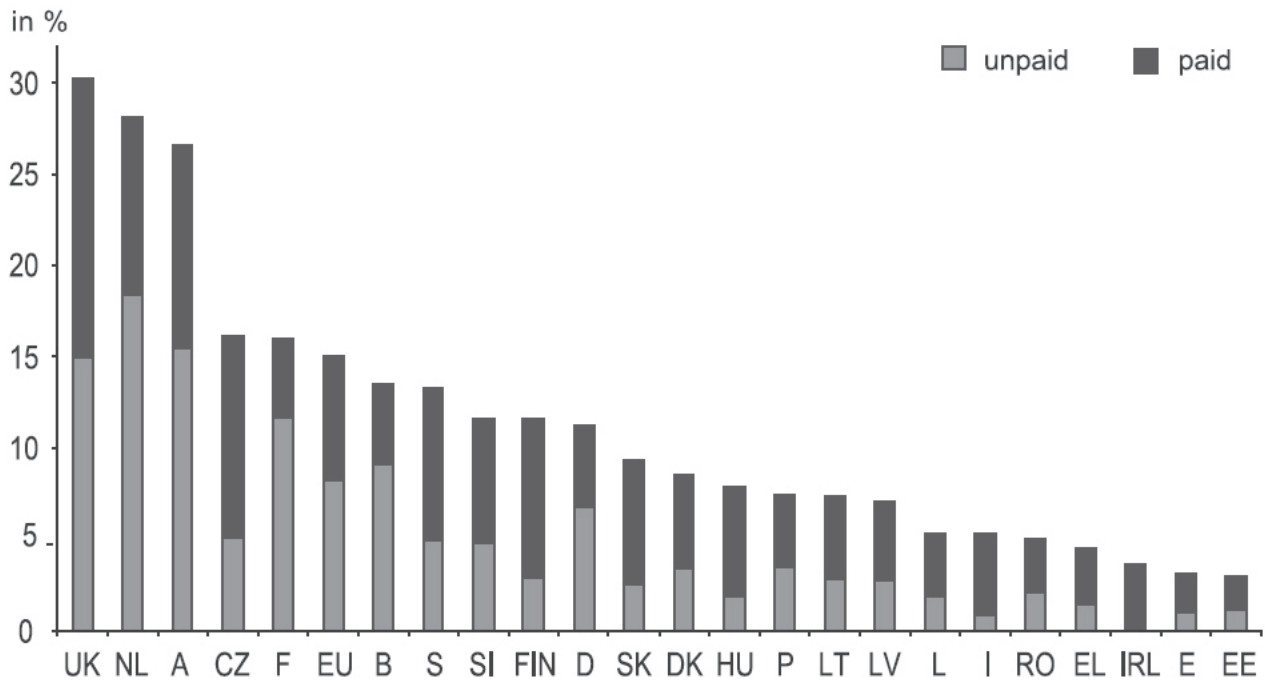
¹⁶ The table only covers the actual member states of the European Union, so the data for Chile, Russia and Serbia are not included.

ent working time is 40 hours per week, which is also practised in all countries of our study¹⁷ except Chile, which has an unusual 45 hours week, Slovakia with 42 hours per week and 35 hours per week in France. That means overwork in France has to be related to its different time scheme. Whereas a French employee with 40 working hours per week actually does overwork, a Chilean or Slovakian employee with the same amount of work is a part-time employee.

The pressure on women engineers and their work-life-balance seems to be higher if they are part of a dual career couple, if they have a lot or new management tasks, if they are at the beginning of their career, if they have a lot of administrative and/or teaching tasks and if they have children. On the other hand, women engineers report that it is easier to balance the two fields of private and work life if they have one home office day per week, if they have flexible working times, if the main attitude in the organisation is that the work should be done (output orientation), if they have hobbies and/or friends outside work and if they have children.

¹⁷ We have no data for Russia about the most frequent work time arrangements.

Table 4. Incidence of overtime work in the EU and the Accession Countries, 2001 (in % of employees)



Source: Eurostat, LFS, ad hoc module 2001

Notes: no data available for the Czech Republic, Latvia and Romania

Children and family were mentioned on both sides, as stressing factor, but also as balancing factor. One reason for that is that singles or women engineers without children were a more probable part of the overworking employees, sometimes also working during evenings and weekends. Some women engineers explicitly reported a change in their habits when they became mothers and they tightened their working schedule and reduced (or at least tried to reduce) meetings outside normal office hours. Another more obvious and also more discussed reason for children as a stressing factor is that having a family for most mothers, but only for a few fathers, means having an enormous double load. They have to do their research work and the organisation of their family lives as well.

Flexible working hours are mentioned mostly in a positive way, but trusted time models or teleworking can lead to a merge of private and work life, which makes it more and more difficult to draw a clear dividing line between working time and leisure time. Also, the reported output orientation most of the time is more an advantage for the companies and universities than for the individual researchers, because their work often does not have a clear beginning and end, there are so many duties which rarely give employees the feeling of a finished work. Another side effect is problems to develop private relationships, because if the working time is not predictable, private appointments tend to have the lower priority. This can lead to a constant imbalance and is one step to a typical illness of management, the burnout.

Part-time working arrangements are seen both as positive and negative ones. It is seen as a possibility to combine family duties and the job, especially if there are small children to take care of. But in fact, most of the part-time workers in Europe are female and it is proven that part-time work is a handicap for women's career.

To sum up, it can be said that the results vary a lot, some women report on accessibility, visibility or availability in a pressuring way, others tell of their well balanced lives and that they are never expected to be reachable on evenings or weekends or have to work overtime. It cannot be said that those differences are influenced by the content of the technology research, or, as we called them, traditional and non-traditional fields. Moreover, it seems to be more a micro-sociological issue, based not only on the culture of the certain organisation, but also very much influenced by the concrete team and its supervisor. The conformity of a group could be one explanation of feeling pressure to do overwork or be available and accessible all the time. On the other hand, the behaviour of working long hours and working on weekends as well is certainly influenced by individuals' attitude and private life framework, that means if the employee has family obligations, partnership, and sees it as important to have friends and hobbies outside work as well. Of course, this focus on private life correlates with social bonding, which is less intense if researchers are working abroad. That means the "lifestyle" of research with its expectations to be mobile and work for a certain time abroad correlates with a work-focused behaviour.

The *third* hypothesis is that women engineers change their career paths not because of the content of work, but due to four dominant stumbling blocks in the working environment: (ambivalent) sexism, “availability-cult”, lack of career perspectives and problems in combining work life with family (children).

Evidence from literature for the third hypothesis: results of the former project WomEng (www.womeng.net; Thaler & Wächter, 2005) showed that women engineers “drop out” of engineering not because they are not interested in the topic anymore. On the contrary, they are still very interested in engineering and technology – certainly because interest is one of the main prerequisites for females to choose engineering degree courses (Wächter, 2003) – but they struggle with discrimination, glass ceiling, problems with work-life balance (Thaler, 2005a, Thaler, 2005b). Some discriminative actions are not very obvious, because their appearance is ambivalent, like the so-called ambivalent sexism. Ambivalent sexism is a rather subtle form of sexism where the negative and hostile aspects are combined with apparently positive (“benevolent”) aspects. Both appear like two sides of a coin. The one seems to show a positive picture, for instance it tells something about a stronger people-orientation of women and that this is so important for engineering research. The other side, however, shows the negative side, for instance it tells something about women being not so machine-oriented, not so rational and logical and whatever it is what engineering research really needs. And just because the compliment of people-orientation sounds positive, it cannot balance out the disadvantages of being called less machine-oriented, less logical or generally less competent, because these are the qualities which are connected to the stereotyped image of a proper scientist or engineering researcher (Thaler, 2005a, Thaler, 2006).

The following methodology for this hypothesis is analysis of answers of women engineers who changed their career paths to the interview question about reasons for change:

- What were the reasons for your latest professional change to your current job?

As the results of this section, we presented again only the most interesting quotes and relevant answers from interviewees, they were not covering all results equally, but in the following section named “conclusions” we summarized the answers and discourses of all interviews in a short but general way based on summaries (entries in our project database) done by all PROMETEA partners¹⁸.

In conclusions the interviewed women engineers from technology research mentioned five main re-

¹⁸ Spanish data are not included in the database.

asons why they changed their former position, field or job:

- To have better career possibilities.
- Personal reasons (family, partner ...).
- To have a more challenging/satisfying job.
- Financial reasons (higher salary; to have less pressure for getting grants or better possibilities for getting grants; ...)
- To have more freedom/time/creativity to do research.

These findings principally support our hypothesis about reasons for career changes of women engineering researchers. Women engineers change their career paths not because they are not interested in their research topic; it is more about contextual reasons. Although some interviewees mentioned that they wanted to have a more challenging or satisfying job, this implicates not necessarily the content of their work.

We did not find much evidence for our first supposed reason, the ambivalent sexism. Sexism, and especially the ambivalent form with benevolent and hostile sexist elements and also open discrimination were a topic in some interviews, but they were rarely mentioned in this question. We found more evidence for it in the questions related to our first hypothesis about (ambivalent) sexism. However, two women reported discriminative experiences which caused their career change. Also, the topic “availability cult”, meaning that being reachable / accessible all the time, was mentioned very often, but only in the questions related to work-life balance which we analysed for our second hypothesis.

However, we found plenty of answers concerning the missing career prospects as a major source of change. Many women mentioned that they changed their career paths at a certain stage to have better career possibilities or in another way to leave a job with no career opportunities (dead-end jobs).

Also, our fourth supposed reason can be agreed on as an explaining factor for career changes of women engineers in research. One interviewee told us explicitly about her burnout, as an extreme form of imbalance of work- and private-life and many others told us of personal and family reasons for their career changes, which underlines our hypothesis in the point of importance of combining family and work lives.

What was mentioned in reality more often than we expected were first financial reasons and secondly the possibilities and time to do research. What came out of many of our interviews with women engineers in research is that they love doing research. Some of them were refusing other jobs and even management careers because they did not want to leave research. But as a matter of fact especially academic jobs cover

much more activities in addition to the mere research. And those, mainly teaching and administrative tasks, are mentioned as hindering factors for the interviewees' research work. They see that as a reason for a change of their career path if they see a chance to get to a better situation in terms of having more freedom to do their own research or having the space and time for creative research. Financial issues were a central topic in the male focus groups, where they stated that these issues were one of their main challenging or hindering factors in their careers. Women engineers also see diverse financial reasons as factors hindering career. On the one hand, they were an expression of the economically difficult situation universities were in and the necessity for academics to obtain funding in order to create their own jobs again and again. And on the other hand, research jobs are not always well-paid. So, financial reasons were a cause for highly educated women engineers to change their research career paths, which should not be underestimated.

Contrary to the women's answers why they were changing their career paths, we also asked them about their motives for a new job. In addition to the reasons for a career change (better/good career possibility, personal and/or financial reasons, etc.), we found two more major motives. This is firstly the research topic itself that is very important for our interviewees, and secondly they told us about the surrounding factors like landscape, easily accessible infrastructure, etc. As an interesting topic itself, it can be stated that, as a reason for making a decision to get a new job and not as a motive to leave the old job, this is another evidence for our hypothesis that women engineers leave their career paths not because of lack of interest in their topic, but for various other reasons. That strengthens the results of other studies (for instance Thaler 2005a), which say that women engineers were very happy with their decision to deal with technological issues and women engineers who left engineering did that for several reasons like sexist and discriminating, hostile environments, but not because they suddenly lost interest in technology and engineering. Women who studied engineering really had a strong interest in and passion for engineering and technology, and this seems to be the case in technology research as well. This passion is even so great, that female researchers avoid management careers because they are afraid of losing the contact with research when they are occupied with lots of administrative and management tasks.

3. Fieldwork in Lithuania

According to **two case studies in Lithuania**, general information about gender occupation in

HES¹⁹, GOV²⁰ and BUS²¹ in Lithuania is: total number of women working in all three sectors is 1816.6 thousand (53.4%). Total number of men working in all three sectors is (total) 1586.7 thousand (46.6%), women who work in HES+GOV – 65%, women who work in BUS – 35%²². Case study was performed at the higher education sector (HES). Nevertheless, in Lithuania annual statistical data on Research and Development is available since 2005. For the institutions and organisations falling under the higher education (HES), governmental (GOV) and private non-profit sectors, continuous surveys were applied. Data on business sector's enterprises are estimated applying a sample method. A list of enterprises, from which the sample is selected, is organised on the basis of the Statistical Register of Economic Entities. Using the national version of the Classification of Economic Activities (EVRK Rev. 1.1), the enterprises are stratified according to the type of economic activity. Research and Development statistics are based on the Frascati Manual.

Therefore, quantitative proportion of HES, GOV and BUS sectors in engineering research in the country is difficult to identify annually. During 2000-2005 in the whole labor market in Lithuania there was not much investment in scientific research and experimental development proceedings. This may be related to some particular gap between industry, business and state science, and studies institutions. Though the number of scientific publications increases rapidly, practically there are no patents registered in the USA, Europe or Japan.

The first case study was carried out at the establishment of higher education, Department of Information Systems. The staff of Kaunas University of Technology consists of approximately 1.000 academicians, including 145 professors and 441 associate professors. There are approximately 17.700 students, in addition to 500 doctoral students. The Faculty of Informatics was founded in 1977. In 1990, the name of Faculty of Computation Technology was changed to the Faculty of Informatics. In 1993, on the basis of work performed by the Information Systems Design research group, the Department of Information Systems was established. Total number of people (staff

¹⁹ Higher education sector. [Accessed on 16 September, 2008]. Available at: <http://europa.eu.int/estatref/info/sdds/en/rd/rd_frascati_manual_2002.pdf>.

²⁰ Governmental sector. [Accessed on 16 September, 2008]. Available at: <http://europa.eu.int/estatref/info/sdds/en/rd/rd_frascati_manual_2002.pdf>.

²¹ Business enterprise sector. [žiūrėta 2008 m. rugsėjo 16 d.]. Prieiga per internetą: <http://europa.eu.int/estatref/info/sdds/en/rd/rd_frascati_manual_2002.pdf>.

²² Department of Statistics to the Government of the Republic of Lithuania, 2006.

and students) by gender at the Department of Information Systems: total number of women for rank A (doctor, doctor habilitus, professor) is 31, which makes 33.3%. Total number of women for rank B (associate professor, doctor) is 52, which makes 40%. Total number of women for rank C (senior lecturer, assistant) is 289, which makes 32.1%; total number of women in the faculty is 3612, which makes 33.3%; in the Department of Information Systems of Kaunas University of Technology in 2007 studied 1400 (450) women, which makes 32.1%. Characteristics of the Female Focus Group (N = 5): field of degree – PhD of Technology Sciences (N = 3), PhD student of Technology Sciences (N = 2). Positions – Professor (N = 1), Assoc. Prof. (N = 1), lecturer (N = 3). Age: less than 30 years (N = 3), 30–45 years (N = 1), over 40 years (N = 1). Characteristics of the male focus group (N = 5): field of degree – PhD of Technology Sciences (N = 2), PhD of Physical Sciences (N = 2), PhD student of Technology Sciences (N = 1). Position – Professor (N = 1), Assoc. Prof. (N = 2), lecturer (N = 2). Age – less than 30 years (N = 2), 30–45 years (N = 1), over 40 years (N = 2). Characteristics of the women researchers 1 and 2: field of degree – PhD of Technology Sciences (N = 2). Position – Assoc. Prof. (N = 2); age – 30–45 years (N = 2).

3.1. Characteristics of the Department.

Scientific research and research-based studies are the basis of the Department activity, therefore, all members of University research-academic staff spend not less than one third of their working time doing research. Participation in research projects is especially important for Bachelor's, Master's and Doctoral (Ph. D.) students, as it is a productive form of learning, allowing to gain practical experience and take part in the creative scientific process. Those scientists who do research while being students, even if they do not become researchers, are exposed to the newest technological advances, develop skills and scientific attitude. In turn, this enables science to renew itself and retain its vitality.

In the second *case study*: Higher education, non-traditional, Electronic Engineering. Biomedical Engineering Centre of Šiauliai University represents non-traditional research area. The centre was established in 1998.

Fields of research are designing, testing and adjusting computer communication systems for the disabled; human coulometer system; image processing. For further research, the following projects were developed in biomedical engineering centre of Šiauliai University in the recent years: FP6 Network of Excellence project “Communication by Eye Gaze Interac-

tion” (COGAIN), FP6 STREP project “Multimodal Collaboration Environment for Inclusion of Visually Impaired Children” (MICOLE), (EUREKA) project “Environment Control System by Eye Gaze Interaction for Disabled” (ECOGASYD). The results of the projects showed that in the total number of engineers in the institution, women staff consists of 153 people, which makes 20.0%.

3.2. Description of career paths in Lithuania.

Higher education

The qualification of higher education teachers indirectly shows the quality and efficiency of higher education. A teacher working in a higher education institution must have at least master's degree. The qualification of the higher education teachers is determined by received scientific degrees and educational titles. In 2006 the Council of Science of Lithuania carried out and published the study “Proposals regarding the qualification description of scientists', researchers' and teachers' academic position” (the head of the expert group was prof. habil. Dr. Leonas Kadžiulis). In this case, on the grounds of experience of Lithuania and other countries it is proposed to describe the qualification of researchers' and higher education teachers/ academics not only by productivity of the activity (number of publications), as it is now, but also in broader categories, such as personal educational achievement, the experience of academic and scientific work, ability to link studies, gradually students, projects of scientific researches. A person seeking to obtain the highest position of science and studies must publish articles in quotable editions of the publishing houses well-known worldwide or publications shaping country's economic, cultural or scientific politics.

Governmental Research

The acquisition of qualification and needs of improvement differ according to functions to be performed and position. Most often the higher education is required.

Industrial Research

For the interviews with women engineers who had a positive career change and what change they made, we chose the following two interviews as our “career change” interviews: one in which the interviewee had made a change from academia to the industry area and the other in which the interviewee had made a change from industry to academia.

One woman said that she changed her job because of the job environment and the wish to pursue a career. A higher salary has influenced the change of the job. Another woman said that she changed a group of women into a group of men. In her opinion, it is easier to work in a group of men as superior employees support her. She is happy working in this team of researchers; however, there are problems, too. In addi-

tion to this, there were career changes among the rest of the interviewees as well. Did you meet any kind of negative career change in your interviews? Which ones? No, not really.

3.3. Results in gendered career.

Results in gendered career paths were identified from career biographies. At first some questions referring to the biographical data sheets of woman engineers were asked: a) are the career paths of your female interviewees standard? In what ways we can clarify that? Or, if not, what are the reasons for non-typical career paths? In Lithuania, women who changed career in HES had standard career path like everybody who passes career development path: bachelor degree, master degree, gradually student and maybe PhD. Most of the female interviewees from Šiauliai University and Kaunas University of Technology represent the type of career – scientific-pedagogical/academic. The careers of our female interviewees are generally typical: they started to work as assistant professor, and then became the associate professor. The majority of women stopped their career growth at this position. Two women from the interviewed graduates of the technical university began their career paths in design bureau at an industrial enterprise. Women working at an enterprise rarely seek getting a scientific degree. It is one of the reasons; another reason is that wage the enterprise was unacceptably low; b) how does family (partnership, children) influence the career path (change of position, responsibility, and money) of female engineers? One of the women who changed career is single and has no children, but she has old mother and father, second woman has five year old child. Both women said that the only obstacle for their career is an opportunity to be mobile and the reason of this fact is family. The majority of employees live in families and they have to combine work and family duties. Though a family consists of a man and a woman, the employers most often attribute the family duties to the women, and the men are considered as if they were bachelors. Such kind of attitudes comes from the past. The viewpoint of society is changing but very slowly, far slower than economics or living conditions. Therefore politics (in this particular case family politics), based on human (politicians and electors) viewpoint, may become a drag for evolution of the society; c) Does the research type (traditional or sustainable) has an influence on their career paths and in what way? No scientific-type influence on career paths of female interviewees was noticed.

3.4. Career influencing factors

Career influencing factors were introduced in such kind of questions: How do the interviewees define career? The women who changed career into aca-

ademic one said: “Having achieved the aim, career is the inner satisfaction of the work”. Women who changed career into industry said: “Career is a change of work conditions which ensures a high salary, respect at work and in the society; it also gives an opportunity to do scientific research work”. What are the main reasons for career changes? The woman who changed career into academic one said that she changed her job because of the job environment and the wish to pursue a career. The second woman said that she changed a group of women into a group of men. In her opinion, it is easier to work in a group of men, as superior employees support her. She is happy working in this group; however, there are problems as well. The main problem is lack of time. How important are career prospects for the interviewees? And where do they see themselves in 5 to 10 years from now? The women who changed career into academic one would like to get a high salary and to have one more child in the future. In the future another woman-respondent would like to have a doctorate, to have an administrative job and to develop the sphere of technology sciences. What are individual supportive factors for the interviewees’ careers? What would help their careers? The women who changed career into academic one said, that the reduction of the teaching load with the unchanged payment would help her career. According to the women who changed career into industry, if there were more women in the group, they could be compared to men and other women working in the same group. In such a way, women’s abilities and knowledge could be clear. Age is also very important. When a woman is the youngest person in the group and has little experience, she only dreams about career. What are the main hindering factors for the interviewees’ careers? A woman who changed career into industry said: “The only obstacle for my career is an opportunity to be mobile”. The second woman named the obstacles, namely a possibility to be mobile and to go on a business trip having a family, which makes it difficult to seek career.

What challenges and problems do female engineers in research face? And which problems and challenges do male engineers in research face?

In Case 1, focus groups of men had to answer these questions:

1) The answers highlight that men dominate technologies; the stereotype of women as having less knowledge in technologies, endowed with “female-specific” personal features generally is expressed. Attitude towards a woman as “the weak sex”, a fragile being who is able to perform tasks requiring lower qualification is highlighted. Statements: Attitude towards women. Attitude towards women differs from attitude towards men, woman’s nature is different. Attitude

towards a woman is more careful, it is aimed not to insult her, and a woman needs more tolerance. Even though it seems that there is no difference in scientific researches, however, personal features, nature sometimes influence technological career of women because, in technology sciences, there is a stereotype stating that “the strong” sex must predominate. These declared differences are perhaps more likely to be personality-related issues. Both men and women can be good scientists. Women are more thorough. If scientific researches are being carried out, projects are being written where descriptions are needed, where much thorough work with documents is required – women are more suitable to carry this out. These are objective factors concerning involvement of women into these activities; however, to my mind, there are no differences, stereotypes are more predominant. Yes, some kinds of activities require more persistent, hard work; other kinds require more organisational work. Men often carry out this hard research work, conduct researches, and women carry out organisational activities. Organisation’s culture, structure often predetermine whether differences between men and women exist in engineering/technology researches.

2) Men unanimously think that there isn’t any problem, and that it is only a useless highlighting of the problem. The present situation when men dominate engineering/technology researches was formed due to objective, naturally expressed reasons. The main reason is women’s nature dedicated for raising and taking care of children, while leaving her professional career aside. Statements: I do not like when it is often artificially indicated that in one or another activity a certain number of women and men must be involved. This is a kind of discrimination. Persons can be selected according to objective criteria, abilities, and not according to sex. And life itself provides a natural selection. E.g., in sales, services, system of education (especially in kindergartens) women predominate, and in the world of technologies men predominate. I agree that there should be no artificial process in order to involve women into scientific career. I suppose that in Western countries it is overdone with escalating the problem of women-scientists in technology sciences. I do not find any problem of such kind in our country. Why is there such a gap between men and women involved in engineering/technology researches? For example, earlier it was maintained that a programmer could not leave for holiday for a period longer than two weeks, because what one has done could be forgotten, and thus qualification could be lost. This is a problem which, to my mind, presupposes the existing situation. Majority of women go for maternity leave, are not working for a long time, and when they return, a big gap in their career is observed, a lot of efforts,

much extra time are required in order to get back to a usual rhythm of work. Even during summer holidays men most often are working, and women take care of families. Everything that we are talking about is objective reasons where majority of minuses is given to women-scientists. Thus, naturally there are more men in engineering/technology researches.

In Case 1, focus groups of women answered these questions:

1) From the interview, some disappointment in the attitude towards a woman as being less clever than a man is felt; it is acknowledged that motherhood is a certain challenge while being actively involved in researches. Statements: every person is different, however, men dominate technological areas due to the opinion that women have no knowledge in these matters, they are less clever. Historically, the first programmers were women; therefore, in fact they are not less clever in the area of technologies; however, nowadays the situation was naturally formed stating that there are more men in technologies. It is necessary to improve oneself in the world of technologies, to update one’s knowledge, to be innovative, keen on cognition of technologies, to spend a lot of time for understanding of technologies; and women sometimes are not able to give so much time to this science because they, more than men, must take care of families, children. I suppose that there is simply such attitude towards a woman as being more dedicated to one’s family; but in fact both men and women can successfully be involved in technology researches. We have a number of such examples. 2) It is highlighted that unequal pay for work exists: men earn more for doing the same work. Employer’s position for men’s sake is obvious. Statements: often more active involvement of men into scientific researches is predetermined by financial benefit. In order to earn much money from research, one needs to work a lot, “to live” inside research, to constantly generate ideas and “sell” them. Only those women whose children are raised by grandmothers get much profit from scientific research. And this is a problem. Perhaps statistics would show that there are no mothers with many children among scientists-researchers: they either raise one child or are not married at all, but moreover, it is useful for an employer to have a “productive” man rather than a woman who often takes care of ill children.

In Case 2, focus groups of men had to answer these questions:

The men-respondents pointed out that women doing scientific research work feel that men-researchers distrust them. They also mentioned women’s lack of self-confidence. One of the respondents stated that women have more concerns about their family.

In Case 2, focus groups of women had to answer these questions:

The women-respondents pointed out that while doing scientific research work they did not notice a negative attitude towards them. However, later on the respondents mentioned that they feel that men-researchers distrust them as their work in comparison to men's one is analyzed more strictly. What did women and men engineers say about in what ways their careers would be different if they were men/women? In Case 1, focus groups of women, women unanimously agreed that men are accepted to technology-related work more easily than women. Statements: in job advertisements, it is often indicated who is needed for a particular position – a man or a woman. Therefore, career could have been started in a different way. I think that it is not an issue what would be different if I were a man. I like my job, I perfectly work both with hardware and software; even though sometimes I hear people saying: "Is it interesting for you what you are investigating – this is men's job." It means that stereotypes are very rooted. Yes, there is even such a saying: "Women have nothing in common with science like men have nothing in common with the sea."

In Case 1, focus groups of men, unanimous opinion is felt in the discussion stating that engineering/technology sciences are more for men. To men's opinion, women's nature and purpose is to raise children, and this is an obstacle for career. The opinion that this is a male science is proved. Statements: my career, perhaps, could be different. When I graduated, the department needed a laboratory assistant. There were excellently studying girls in our group, but I was invited to work, being not the best in the group. Why? The answer was: "Because it was required to maintain computers, to move them, to plug them in. I doubt whether women have to perform such works requiring physical power". These are particular cases showing why men dominate technical field at higher education institutions.

"When I graduated from the university, we were invited to the department on the honest basis: taking into account academic average. At that time there was a competition to occupy the position. Two men and one girl of us were left to work at the university. Because the works were not always acceptable for the woman, she left this work soon. Therefore, this science is more men-like. Maybe it would not be in a different way, but I support opinion that women are more inclined to humanities, and men are more inclined to exact sciences".

In Case 2, focus groups of women, women-respondents think that if they were men, their career would be different, i.e. they would not have problems related to housework and raising children. Furthermore, they would be more mobile and the attitude

towards them would change. The respondents mentioned women who do not do scientific work because of their family: there were no grandmothers or nannies who could look after their children, their men reproached them about not making dinner and about coming home from work late.

In Case 2, focus groups of men, the men-respondents do not know what their life could be if they were women: "Perhaps I would be a housewife or I would do another job". One man said: "Maybe my life would be different if I was born another day, in another country, and not of different sex".

3.5. Results in gendered organizational cultures.

Gendered resources and work tasks in engineering research: a) how satisfied are interviewees with their individual time distribution for certain work tasks? The women engineers devote most of the time for further training and conferences (including preparation and attendance), average amount of time for research tasks (development of methods, testing, publishing etc.), teaching and meetings, devote very little time for raising funds for research, management, routine administrative tasks, advising, committee work. The difference between results of both women are: the first woman devotes very much time for the same jobs as the second woman, however she devotes average amount of time for management task, routine administrative tasks, and she devotes less time than the first one for research tasks and meetings; b) which of these tasks do they assess as relevant for career progression in their institution? Further training, presentations at conferences, research, integration in and exclusion from career-relevant information/networks a) which formal and informal communication channels are practiced and do the women engineers feel being part of it? Formal communication channels: official meetings, internet, e-mail, telephone, conferences, consultations, seminars, symposiums, forums. Informal communication channels: lunches, coffee breaks, picnics, birthday parties, excursions, going to theatres, etc. The women engineers positively feel being part of it; b) did interviewees tell how they evaluate the influence and extent of informal information in comparison to the formal one? Interviewees mentioned the importance of both formal and informal communication channels. Individual experiences with networking and networks (related to career progression) a) which experiences do the women have with networking? Are there any barriers for women? Which ones? The woman thinks that cooperation is important for the career. She willingly cooperates with others and believes that it helps to pursue career although she does not think about it yet. She devotes much time to

cooperation but, unfortunately, she is short of time. When socializing she does not feel any difference in sex.; b) how does networking influence career progression and are women aware of these influencing mechanisms? Interviewees said that influence of networking in women's career is very important. Scientific and institutional appreciation of women engineers' achievements a) did women engineers experience that their work is valued and recognized? From whom do they get this feedback and how? Female interviewees said that their colleagues and superior employees are satisfied with their work but they do get rarely any feedback from the academic society. Integration in/or marginalization in social work community. a) How do the women engineers describe their social work environment? Are there any problems or specifics related to gender? A woman who changed her career to industry describes her social work environment as good one, because a woman does not have any difficulty in socializing with superior employees. On the contrary, she feels her colleagues' moral support. In the woman's opinion, rivalry appears when people working in the same sphere of research do not agree on carrying out tasks and duties. At present a woman has no opinion on the tasks which are being carried out and does not seek higher positions. She likes cooperation in a team. It is easier to carry out all necessary tasks when you are responsible for something. The women who changed career into academic one said: "Both cooperation and rivalry dominate at work. In her opinion, sound rivalry is useful". She likes cooperation in a team. She has no difficulty in socializing with superior employees. The woman thinks that it is an advantage to be the only woman in team. Various events, which unite the staff, are constantly organized inside and outside the workplace: a) if you compare both case studies, are there visible institution-related differences concerning the answers, if yes, which ones? But substantial differences between both cases were not found in carried out fieldwork. Effects of masculine working culture on women's career aspirations/progress: a) are women engineer's career aspirations affected by masculine organizational culture (e.g., being available all the time, exclusion from networks and/or information)? The woman who changed career into industry named the obstacles, namely possibility to be mobile and to go on a business trip having a family, which makes it difficult to pursue career. She feels no obstacles to pursue a double career but she does not think about it yet. She feels men's support which does not help to make a career. She can gather all the information necessary for the scientific work from her colleagues. The woman who changed career into academic one claimed: "The only obstacle for my career is an opportunity to be mobile". She feels no obstacles to make a double

career as well as she feels no different expectations concerning sex. A special work culture does not disturb her career. Both men and women provide her with the information necessary for the scientific work. Integration in and exclusion from men's networks: a) are there barriers for women engineers to enter men's networks? One of the female engineers said: "If you inquire about collaboration in career between representatives of different sexes, I do not notice any difference. The one who is more active, showing initiative, does not matter whether a man or a woman, invites a colleague or a specialist from the same field for work. Perhaps in collaboration mixed pairs of scientists are being formed more often (laughing). Collaboration is always an important matter, and, in order to obtain better results, while working alone it is hard to do this". Women pointed out, that they have no barriers to enter men's network. Information for the scientific work is searched for in the information channels which could be pointed out by the colleagues. In women's opinion, communication does not depend on the difference in sex. Both men and women can help each other in scientific activities. However, it depends on a person's character: if a person is good-natured, it does not matter whether it is a man or a woman: b) what are the benefits of networking? One of women-interviewees claimed: "If to speak about pedagogical work, it is a must for the lecturers delivering the same subject to collaborate. It exists among us; however, in general, collaboration in this field could be more active: publishing of instructional aids, conspectuses, presentation of tasks of the same level and etc. If to speak about research activities, there is more collaboration in project activities, and publishing of scientific publications is rather an individual issue, like everyone's research topic is rather specific"; c) do women feel being a part of powerful networks? Women respondents entirely agree that networks are very important for they work; d) if you compare both case studies, are there visible institution-related differences concerning the results for a), b) and c), if yes, which ones? Effects of masculine working culture on women's career progress: a) did the women tell about gender-specific factors for getting a higher position? Women agree that personal features of men are more suitable for leadership. Statements: In general, there are few women in technology-related researches; that is why it is obvious that there are less of them holding the highest positions in research activities. Women's qualification is not always suitable for occupying the highest positions. Men often have higher achievements in this field. Their competence is higher, that is why they take the lead. Men are rough, have more features characteristic to leaders; b) are women engineer's career aspirations affected by masculi-

ne organisational culture (e.g. being available all the time, gender hierarchy, exclusion from networks and/or information)? Yes, they proved this statement. b) If you compare both case studies, are there visible institution-related differences concerning the results for a) and b), if yes, which ones? The use of collaboration between men and women is a possibility to exchange information, to be involved in groups of common interest. There are more contacts, communication and opportunities. A problem to manage everything on time occurs. Among contemporaries, sexual differences in career are less noticeable. A bigger intolerance is observed among representatives of different generations. Those working for longer time sometimes unreasonably underestimate new knowledge and experience of youth. Integration in and exclusion from men's networks: a) did the participants talk about initiation into networks? What counts for becoming a part of it? Are there any barriers? Formal communication channels: official meetings, Internet, e-mail, telephone, conferences, consultations, seminars, symposiums, forums. Informal communication channels: lunches, coffee breaks, picnics, birthday parties, excursions, going to theatres, etc.; b) what are the benefits of networking? Men participants entirely agree that networks are important in their work; c) if you compare both case studies, are there visible institution-related differences concerning the results for a) and b), if yes, which ones? In collaboration, men do not find any gender differences. Effects of masculine working culture on men's career progress: a) did the men tell about gender-specific factors for getting into a higher position? While discussing the gender factors for getting into a higher position, different nature of a man and a woman as well as personal features are emphasized again. Men have the need to control, they are self-confident, dedicated to possibility to control, and this is the expression of power and manliness which is distant to women. There is more stress and responsibility in leading work, and "resistant" men are more suitable for that. Thinking of men and women differs. Thinking of men is more constructive, and women often get lost in complicated situations. Perhaps that is why we will not find any men working in a kindergarten; men are more leaders by their nature. Women are more modest and often their particular features are not expressed; women do not express themselves; that is why more self-confident men naturally occupy the highest positions; b) are men engineers' career aspirations affected by masculine organizational culture (e.g. being available all the time, gender hierarchy, exclusion from networks and information)? Men did not note about male engineers' career aspirations affected by masculine organizational culture; c) if you compare both case studies, are there visible institution-related differences concerning the results for a) and b), if yes, which ones?

3.6. Top women.

In which sector (HES, GOV or BUS) was it most difficult to find top women in your country? To find a top-woman working at the research center of an industrial enterprise is quite difficult in Lithuania. The top-woman that we spoke to belongs to HES and GOV sectors. She is the first woman chosen as academician at the Lithuanian Academy of Sciences. She is a distinguished scientist in Lithuania; the majority knows her as sociable and kind scientist. The second one was woman-scientist, professor working at University. She is the only woman professor in "male" collective at the Department of Information Systems. It is quite difficult to find a top-woman who works in industrial research centers in Lithuania. Therefore, the previously-mentioned reasons determined the present selection. Where there any difficulties in getting access to top women, for example reluctance to be interviewed, refusals, etc.? No, there were not. Were there conflicting views on this? a) Views of women researchers in case studies Perhaps statistics would show that there are no mothers with many children among scientists-researchers: they either raise one child each or are not married at all. Actually it is more useful for an employer to have a "productive" man rather than a woman who often takes care of ill children. It is highlighted that unequal pay for work exists: men earn more for the same work. Employer's position for men's sake is obvious. The other serious problem is raising children. It is difficult for a woman to do all the work, i.e. pedagogical work, scientific work, housework, etc. Problems related to finances are also topical to women-researchers. In order to earn more money, women increase the teaching load, participate in various projects. That is why they do not have their free time which could be devoted to themselves and their children; b) views of male researchers in focus groups. The answers highlight that men dominate technologies; the stereotype of women as having less knowledge in technologies, endowed with "female-specific" personal features generally is expressed. Attitude towards a woman as "the weak sex", a fragile being who is able to perform tasks of lower qualification is highlighted. Men unanimously think that there isn't any problem, and that it is only a useless highlighting of the problem. The present situation when men dominate engineering/technology researches was formed due to objective naturally expressed reasons. The main reason is women's nature dedicated for raising and taking care of children, while leaving her professional career aside; c) views of top women themselves. First, one should need to do something. 'To strive for a position' is not a purpose. Usually there is a purpose to work on a project, to solve a problem. There should be a wish to solve a problem and

to work in that direction. And it may be impossible to occupy a certain position due to the reason that one simply may be worth it but competition or circumstances block it. That is why I suppose that to strive for a certain position is not the right purpose. It may make a very negative impact on one's state of mind. Of course, it is good when everything is going fine, but it should not be given prominence. The woman said, "I did not seek my career deliberately. It was determined by fate. I tried to do the most necessary things." In her opinion, it is easier for women to work in the spheres of humanities and social sciences since men dominate the spheres of technology and physical sciences. Please summarize on the basis of your fieldwork what informants say are the main reasons why there are so few women at the top of technology research: a) views of women researchers in case studies. Women less often choose to study in engineering/technology fields. Women have to work twice more and harder in order to prove their competence. There are not many women engaged in technology/engineering researches. Patriarchal traditions, stereotypes and attitudes exist in our society: women are completely responsible for taking care of little children and housekeeping. A stereotypical attitude towards unequal abilities of women and men is very widespread. Women agree that personal features of men are more suitable for leadership. b) Views of male researchers in focus groups. While discussing the reasons blocking for women to occupy the highest positions in engineering/technology researches, again different nature of a man and a woman as well as personal features are highlighted. Men have the need to control, they are self-confident, dedicated to a possibility to control, and this is the expression of power and manliness which is distant to women; c) views of top women themselves. I suppose that women tend to dedicate themselves to their families, homes, and they achieve not less in this area if to compare with professional career. Under certain circumstances, they can dedicate themselves to career. There are few of those who would consciously pursue career from early days. I do not know how to explain it. There are not many women who have high position in the sphere of technology research and engineering research. The same situation is in other spheres of life. As a matter of fact, women have a special purpose in life, which is family and children. While women are doing their duties, men can easily make their careers. One respondent says that nowadays it is easier for women to make a career in comparison to women of her generation. However, personal features, strong will, intellectual preparation, etc. play a very important role as well. She does not approve of the dilemma? What to choose: the career path or family (or children)? In her opinion, family, children and career are important.

It is possible to match everything. But if it is difficult to match, family should be in the first place and career should go after that.

4. Good or bad policies, good or bad practice

Women career development and support (including training) do not have special measures such as mentoring, self-development schemes, etc., but in National Action Plan for Women and Men Equality (2005–2009) the national strategy Women in/and Science should be followed. Ministry and the FP6 project Baltic state network: BASNET: Women in science and high technology (FP6 Project No 017170 2006–2007): the project demonstrates the systematic and complex approach to gender equality problem in Science and HT in the Baltic States. It is a logical continuation of the work done by ENWISE group. The aim of the project is the establishment of the interregional Baltic States Network "Women in Science and HT" among women working groups, professional organizations and corresponding departments of the governmental institutions for creation of the common Baltic States strategy to increase women participation in Science (S) and High Technology (HT). It will help to compare and evaluate the existing policy measures and develop synergies between the national and the regional policies and formulate the new attitude to the problem. With a view to ensure good substantiation and higher efficiency of the developed strategy, much attention will be given to the sociological analysis of factors determining underrepresentation of women in Sciences and HT in the Baltic States. The periodical exchange of experience and good practices for realization of gender equality in research, dissemination of the information and fostering of the integration of the gender dimension throughout the European research will be provided in the framework of the project (<http://www.ff.vu.lt/basnet/>). Structural support granted by the European Union for 2007-2013 is aimed to finance the program for Women in Science and Engineering: linking girls, young women and their Technological Futures through Educational System. Fulfilling work-life balance issues at university as learning innovative organization is ongoing testing at Šiauliai University, where social services are provided to all female doctoral students (<http://family-university.su.lt/>). The research on women research relevant issues in the work-family balance is ongoing in the project. Workplace culture: the environment of labs and universities does not correspond to women bodies and issues. Women are seen as mothers/wives, not as engineers, innovators and potential HR. Women at the top of research or research management usually are single and do not have their own family. Gender stereotypes stay rooted through the men-caring viewpoint to wo-

men researchers; women usually bear the odium of men and have to suffer and do not show their ideas, they are used to keep silent, they do not demonstrate erudition and tolerate this kind of stereotypical gendered relationships between women and men. The same strategy she uses at home (her husband is professor, too). Men in research have their own very strong “gentlemen clubs”. Women do not use the “glass ceiling” breaking strategies and there is no solidarity between them, because the competition and rivalry in the science area is big. The organization and the good practice. Orientation of the organization (specific policies and initiatives and in which areas). **LABOUR CODE OF THE REPUBLIC OF LITHUANIA ESTABLISHES:** For employees raising children under three years of age. Employment contracts with employees raising a child (children) under three years of age may not be terminated without any fault on the part of the employee concerned; part daily working time or part weekly working time shall be set on request of an employee raising a child until it reaches three years of age or under agreement between the employee and the employer. It shall not result in limitation when setting the duration of annual leave, calculating the length of service, promoting an employee, improving qualification, as well as shall not limit other labour rights of an employee; employees raising a child under three years of age may be appointed to be on duty at the enterprise or at home, to work at night or during holidays as well as work overtime only upon their consent; employees raising a child under three years of age shall be entitled to choose the time of annual leave after six months of uninterrupted work at an enterprise. Also, they shall be entitled to be granted the annual leave after six months of uninterrupted work at an enterprise. Men shall be granted their annual leave on request during the maternity leave of their wives. Employees raising a child before he has reached the age of three as well as the employees who are raising, as single parents, a child before he has reached the age of fourteen or a child with disabilities before he has reached the age of sixteen may be sent on a business trip only with their consent. Parental leave before the child has reached the age of three shall be granted, by the choice of the family, to the mother/adoptive mother, the father/adoptive father, the grandmother, the grandfather or any other relatives who are actually raising the child, also to the employee who has been recognized the guardian of the child. The leave may be taken as a single period or be distributed in portions. The employees entitled to this leave may take it in turn. During the period of this leave the employee shall retain his job/position, with the exception of cases when the enterprise is dissolved. Unpaid leave shall be provided during a maternity leave and parental leave before the child has reached the age of

three years to the father on his request (to the mother during parental leave before the child has reached the age of three years). The employees raising a child with disabilities before he has reached the age of sixteen or two children before they reach the age of twelve shall be granted an additional day of rest per month or their weekly working time shall be shortened by two hours; the employees who are raising three or more children before they reach the age of twelve shall be entitled to two additional days of rest per month or their weekly working time shall be shortened by four hours and shall be paid the average wage. Unpaid leave shall be provided on the employer’s request to the employees raising a child under 14 years of age – for up to 14 calendar days, to employees raising a child with disabilities before he has reached eighteen years – for up to 30 calendar days, for a wedding – at least three calendar days. The total duration of the above leaves may not be longer than three months. **THE LAW ON SICKNESS AND MATERNITY SOCIAL INSURANCE OF THE REPUBLIC OF LITHUANIA.** The right for maternity (paternity) benefit is granted to one of the parents (foster parents) or guardians, who is: insured under this Law; is on a parental leave until the child reaches one year of age; during the last 24 months till the first day of parental leave has been covered for at least 7 months by sickness and maternity social insurance. A person who has no right to maternity (paternity) benefit from the funds of the Social Insurance Fund Board is entitled to an allowance. Maternity (paternity) benefit is paid during the period of parental leave starting from the pregnancy leave and the end of confinement leave till the child reaches one year of age. Maternity benefit amounts to 80 % of the compensated wage of the payee, paternity leave benefit amounts to 100 % during one month.

4.1. Career support and development.

The good practice is perceived as assistance while doing scientific work and pursuing one’s career. Men and women have equal opportunities. However, a woman raising a child or several children has to be able to combine her personal life with her work. The employers have no right to apply different regulations for women. The aforementioned fact is unacceptable and, therefore, cannot be tolerated.

4.2. Work-life balance.

The majority of women complained about too heavy pedagogical/academic load. The women choose a heavier load because they want to receive bigger payments. The lecturers’ payments depend on the factors which also depend on the efficiency of scientific activity. This often leads to a closed circle, i.e. the work is done in order to receive payment but the time

to conduct scientific work is insufficient, the scientific product as well as the factors is small, therefore, the heavier pedagogical load must be taken. The women who work in companies have a more flexible schedule. However, only two women of the aforementioned participated in the survey conducted.

4.3. Workplace culture.

The women under investigation did not complain about the work environment as they maintain good relations with men and their directors. Official relations are determined to be good, although several cases when a director had a stereotyped attitude towards women including his own daughter who does a scientific work in technology field were identified. Men colleagues share information and sources of information are available to women in the same way. On the subject of career, the women noticed that the management of the faculty of technological nature requires special abilities and character traits. The representatives of social sciences do not suppose anything but the subject discussed is technology sciences.

Objectives for the good practice (the organization's reasons for the particular good practice), implementation and target group

The women do not face any discrimination. There are no examples of good practice in Lithuania. Only one paper variant is available which will possibly be applied after a period of several years. Modern women do not face any official assistance, it may only be provided by the leaders. The state provides support for women who raise children.

Support for the future

Special Child Care Centre, as innovative mean, is tested at Šiauliai University by the financing of ES EQUAL initiative project "FAMILY UNIVERSE" (<http://family-university.su.lt>). It is intended for families of staff and students and was established in 2005. The aforementioned center assists parents in raising children along with special services, the purpose of which is to take care of the children. Children may attend Child Care Centre at the university and therefore mothers can leave their children under the care of the specialists. Universities participate in various projects, the purpose of which is to analyze women's problems. At the university, Woman/Gender Study Centre was established in 1998, which in 2005 was reformed into Gender Studies Institute, which is seeking to ensure better work-family balance, women position, monitors gender situation, carries out research on gender issues, etc.

4.4. Experiences of the target group.

The "publicité" (advertisement) and promotion of good practice at academic and research institution were studied, too. The website of Šiauliai University presents the structure of University and its subdivisions, the institutions which assist in finding the way to solve the problems. Women share information or receive it from their immediate director. The women under investigation were surprised to hear about good practice, which has been completely unknown before. The participation of the target group, good practice is not necessarily related to organization, it may be considered as assistance provided by the immediate director. The women who received financial or moral support were very pleased. However, such a situation is rare. We do not have any statistics on present impact of good practice. The women under investigation think that good practice would assist them in doing scientific work. However, they also consider it as an unreal one. Currently the women would like their pedagogical load to be decreased. This would also give more time for doing scientific work, while good practice does not depend upon them. The understanding of the colleagues, the efficiency of good practice has been assessed by both women and men. A man who read about good practice in a foreign press, told: "I would like to know more about good practice and its general organization". His wife works in the field of technologies and, therefore, he understands the women's problems. The women do the same works as men and, naturally, would like to be better understood at their workplace, by their colleagues and superior employees. They do not want any special conditions for them but human understanding when their child is ill or they get ill themselves as sometimes some comments on the work done are made. Life in Lithuania is changing so quickly, Lithuanian women are well educated and they are initiative to grasp innovations for better life. Women hope that good practice will be more considered in future.

Other helpful measures (proposals).

Women who are in scientific career indicate family issues. In this research about family responsibilities masculine culture is clearly seen. The PROMETEA research has led a good understanding of the work conditions in the research and technology that impact on the recruitment and the career of women engineers, such a masculine workplace culture in which long hours and mobility are the norm. In the context, childcare, although a big issue for all working parents, has also been found to impact more on the work lives of women.

Several factors can be seen as a pillar of the masculine workplace culture:

Role models:

Theoretically, all case studies emphasize that there is no difference between careers of men and women. Nobody prevents women from having a scientific career and the evaluation criteria are the same. In the real life, women have to be devoted to their family responsibilities and childcare more than men.

All cases studies indicate that family responsibilities and childcare rest on the shoulders of women and there are very few differences among countries. The consequences of this situation of the women's career are considered women's issue in many countries.

The results of cases studies from Lithuania and Russia show that traditional role models are still very much at work, as one woman in a focus group put it.

"In the first place we have our family issues and only after that start dealing with our personal issues, such as career". (Russia)

A Lithuanian woman engineers says: "If a woman wants to have special achievements in the sphere of technology sciences, she has to be free from family trouble".

In France and Spain it also seems to be taken for granted that women are primarily responsible for children. In the Austrian male focus group from the non-traditional sector, children care was discussed as women's issue. Following a common way of thinking, gender is considered a woman's issue only.

Nevertheless, childcare is not the only care responsibility (predominantly) women may face. Care for dependent elderly and other members of the extended family and social network may also put strain on women. As it was mentioned in the National Report of the UK team, "Some individuals may be involved in looking after their own parents, parents-in-law or other relatives and may face similar issues to those with childcare responsibilities, but with less recognition for their needs. It may also be the case that some will have both child and eldercare issues running concurrently".

5. Analysis and conclusions of the case study

5.1. Overall evaluation.

Analyzing findings in the light of other PROMETEA, e.g. barriers to/support for career progression, we have to point out that currently the situation has improved and women can notice attention paid in form of various programs and projects. However, they understand that everything depends on them. The main obstacles for the career are insufficient women's self-confidence and, naturally, stereotyped attitude which may be felt not directly, but through distribution of tasks, etc. The opinion has also been formed

that the manager in the field of technologies should be a man. The women raising children told they would be very pleased if their superior employees and colleagues considered their conditions and assisted them when arranging working hours in accordance with the current situation – if their child gets ill, to do their work at home or present it later, i.e. to apply flexible schedule. The women who participated in the research were glad that somebody is concerned about their problems.

There is a high percentage of women researchers who are "**the winners among the losers**", after collapse of USSR, because former Soviet ideology, Sovietology, promoted gender ideology, but not gender awareness. After accession to EU., post communist democratization provided much more opportunities for women researchers and public gender equality policy as well.

Lithuania should be associated with North European region – Sweden, Denmark, Finland, Norway. It is not wished to be associated with Eastern Europe. North European countries are considered as economically strong, socially responsible and democratic ones, so association with strong North European countries is natural process. Geographically, Lithuania is North European country – that was determined in the United Nations geographic partition of World regions and countries.

Public sector is more emancipated and articulated than private (family responsibilities, household not regulated by the law) one. In 2007, the World Economic Forum launched a new framework for measuring equality – the Gender Gap Index (GGI), where Sweden (1), Norway (2), Finland (3) and Iceland (4) were mentioned once again at the top of the rankings in the latest Global Gender Gap Report. All countries in the top 20 made progress in comparison to their scores of last year – some more than others. Latvia (13) and Lithuania (14) made the biggest advances among the top 20, gaining sixth and seventh places respectively, driven by smaller gender gaps in labour force participation and wages. The Report covers a total of 128 countries, representing over 90 % of the world's population.

The principle of equality in rights was used in the Soviet society deprived of rights from the point of view of estimating the duties of women in respect to society. A woman received her right to work as duty, and also the right of motherhood as duty. At the same time, social policy of motherhood protection: maternity leaves, workplace nurseries and kindergartens, extra safety working conditions for pregnant women etc. was developed. Thus, despite the fact that "new legislation" ensured a maximum of state intervention in private sphere, the new social order was more liberal in respect to women than it was in the period of pre-

war independence. Moreover, although Soviet legislation strictly provided for full employment of the population, a woman with children could never be accused of “parasitism”. The Constitution of Developed Socialism (1978) also secured equal citizens’ rights before the law, emphasized and ensured equal women’s and men’s rights by granting women and men an equal access to education, equal opportunities in employment, by special labour and health protection measures for women, by legal protection, and material and moral support for mothers and children and so on.

In the communist states, the emancipation of women was considered necessary for the overall socialist revolutionary project – attainment of “Communism Builder” features and was therefore ordered from above through the Women’s Soviet or Trade Unions in the institutions, through all the ideology of Soviets. To achieve unified emancipation, legal equality between men and women was introduced, women were encouraged to work outside the home, to take equality of opportunity in education and private life, and sexually exploitative images and writings as well as prostitution were prohibited. A soviet woman first of all was a good worker, sportswoman, member of Comsomol (Young Communists’ Union) or Communist Party, very good household keeper and great wife helping her husband in career development. Soviet propaganda firmly spread ideas about equal rights of women and men. A woman from a Soviet ideological point of view was regarded as someone who can dig ditches, drive a tractor or, at her best, fly to the outer space.

Lithuania’s current situation is specific and individual as results of its socialist gender equality ideology realization, traditional, often archetypical, gender stereotypes and technologic society values of modernistic free market interchange. Not so long ago, in soviet times, women in former USSR used to perform double, sometimes controversial, socio-professional role. On the one hand, while putting ideas of socialist feminism into practice at national level, a woman was assigned an active part in manufacturing, politics and social life.

On the other hand, though government made efforts to ease some of woman’s load of children care and improve conditions of life, women were not exempt from duties that were assigned to them by traditions of patriarchal society. Moreover, men obtained high social and professional status exclusively (women were in the minority among high rank party functionaries, officials and manufacturers).

The gender equality model through sameness (equal opportunities or equal treatment) in sense, with male norms as the standards, was used. Traditional equal opportunities policies were limited, because they mean that women can only gain equality with men if they are able to perform to the standards set by men (Guerrina, 2002, Rossilli, 1997). Equality du-

ring the Soviet period was of a pseudo nature, yet it was not so bad, in the sense that formally it instigated some equality; to become a housewife was not the minimum ambition. Women were to fulfil two roles in society, a “maternal” function and a role in production – childcare facilities and paid maternity leaves were consequently provided for, quotas ensuring the representation of women were introduced.

In conclusion, we can declare that for nearly twenty years countries of Eastern Europe were moving from a developed socialism / communist regime and “planned economy” to a post-modern world and a postmodernist conception of the world and industry. **Public gender equality system became more modern, but private system (family, personal life, work-family balance) and patriarchal societal stereotypes are still very traditional.** The high figures of women employment in E&T research sphere is the heritage of mentality, attitudes and needs of post soviet, post communist democratization or post totalitarian countries with compulsory welfare regime. Eurostat research made in 2006 confirms that proportion of women in science and technology sector in Lithuania is one of the highest in EU and reaches 72.0% (in comparison, it is 69.7% in Estonia, 64.8% in Latvia, 51.6% in Sweden, 48.6% in Great Britain).

In my analysis, I reject the rigid interpretation of current situation of post-communist countries’ democratization policy by postcolonial approach. Postcolonial theory is a valuable perspective for examining gender equality social policies, because colonialism was one of the most profound and significant experiences that shaped the Western world’s perception of people belonging to non-Western races and ethnicities (i. e. the West’s *others*) (Said, 1979). As Prasad (2002:65) notices, “*women and Eastern European managers are regularly constituted as exotic, inadequate or underdeveloped others who need help, tolerance and acceptance from the dominant majority (Western) groups*”. Though such intentions appear and may well be progressive in their objectives, their actual effects can continue reproducing older imperial-style relationships between the West and non-West *other* (Koster, 1995). My research data reveal that in Lithuania, the change of gender equality social policy in post Communist democratization liberal welfare system occurred later than restoration of independence in 1990 and we do not lack skills of advanced civilization culture, but economically we lag behind our Western counterparts. Hence, I point out the changes in Lithuania’s gender equality welfare system not only because welfare system became reorganized top-down by bringing down the number of gender equality social policy, gender mainstreaming strategies, transnational and national obligations, EU, CEDAW reporting, etc., it also was reorganized by selecting an expert-bureauc-

ratic model against participatory-democratic, gender transformation model, for implementing gender equality policies and gender mainstreaming as a part of human development and democratization performed by specialists, civil servants. Changing the procedures and making the welfare system more regulative and bureaucratized are the causes why it started functioning as a post Communist semi democracy operating between two heritages – socialism and capitalism, therefore many widely accepted theories of democratization fail when confronted with the evidence of post Communist democratization case.

5.2. Career gaze at East – West dynamics.

The paths of women career in E&T contexts and cultures, including the mainstream of gender equality, from an “East-West” perspective were largely unexamined in the former state-socialist countries, and the role of gender in scientific knowledge production is still an underresearched topic in East and West. Studying local knowledge contexts and cultures and the development of engineering research, with special attention paid to gendering of these cultures and communities, we did not discover clear differences between “East-West” women’s careers. Contrasting common problems are revealed: underrepresentation of women in sciences and research, high underrepresentation of women in engineering and technological sciences, a big gender disproportion in the highest academic and scientific management levels, bigger average salaries for men researchers in comparison to women researchers.

The East-West dynamics as analytical theme examines discourses of competition and catching up required not only by post-socialist countries. It also explores researcher mobility and “brain drain” and the (in)visibility of local (cultural, historical) contexts. Catching up, competition and internalization discourses seem to exist universally across all the countries under study supporting the entrepreneurial outlook of research. In post-socialist countries there is additional specific stress on achieving Western standards; Western welcomed new, post socialist “others” to much more competitive environment. All regions – South and North, East and West of EU – are dimmed by a westward-looking anxious gaze watching the results of other “competitors” in building the European research area.

Short time to adopt a highly developed understanding of gender equality policies and gender-sensitive policy instruments forced the marginalization, diversification and segregation of different social groups of women. Gender equality question was not (or very weakly) raised as a part of democracy in the whole society as well.

To achieve unified emancipation, legal equality between men and women was introduced in the nine-

ties: women were encouraged to work outside their home, to take equality of opportunity in education and private life. The model of equal valuation of difference – valuation of existing and different contribution of women and men in a society segregated from a gender point of view and transformation of gendered practices and standards of evaluation – new standard for both women and men is expected to be used and transform relations between women and men. Gender mainstreaming cannot replace specific policies which aim to correct situations resulting from gender inequality at national, European and global levels. At the heart of globalization are a set of centre-periphery relationships and current geopolitical reality and global hegemonies that mediate in the formation of the novelties in gender (in)equality. Specific gender equality policies and gender mainstreaming are dual and complementary strategies and must go hand in hand to reach the aim of gender equality. The main objective of activities around this issue is to draw attention to and initiate a debate about the fact that gender equality cannot be achieved by women alone, but only by women and men working together in GOV, BUS, and HES areas of E&T research. Progress in the future depends on a true dialogue between women and men, on sharing of responsibilities between the sexes both in the private and the public spheres. In short, men are now expected to support and to take part in promotion of gender equality.

The strategy of gender mainstreaming has revealed that men can also expect an improvement in their lives from the achievement of gender equality. At least, it will help men to question their traditional roles, just as women have already done, and possibly help them to live more satisfying and complete lives, through a greater involvement in the family and caring activities.

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LYČIŲ KARJEROS KELIAI INŽINERINIUOSE, TECHNOLOGINIUOSE IR TAIKOMUOSIUOSE MOKSLUOSE NACIONALINĖJE IR VAKARŲ–RYTŲ PERSPEKTYVOJE

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Santrauka

Šiuolaikinis mokslas šiandien tampa įvairių gamybos ir mokslo sričių derybų vieta. Nors rinka daro vis didesnę įtaką mokslo tyrinėjimams ir aukštajam mokslui, iš tradicijos akcentuojamas racionalusis žinojimas. Visuomenės grupės, sudarytos iš akademinės bendruomenės, pramonės, valdžios ir valdymo institucijų bei visuomenės atstovų, teigia norinčios mokslo atstovams pareikšti savo nuomonę. Visi debatų dalyviai vaidina labai reikšmingus vaidmenis įvairiuose tarptautiniuose kontekstuose ir geopolitinėse erdvėse. Šiuose procesuose aiškus lyties aspektas: nuo mokslininkų įsidarbinimo ir išsilankymo mokslo karjeros kelyje iki aukščiausio mokslinio lygio standartų, profesinių ir šeimos pareigų derinimo iššūkių bei naujų žinių ir praktikų, kai atsižvelgiama į lyčių skirtumus, kūrimą.

Lyčių lygybės klausimas moksle pagreitino lyčių lygybės principų taikymą kitose naujose šalyse narėse. Taigi susidarė palanki situacija palyginti žinių kūrimo procesus ir tyrinėti numanomus ir galimus Rytų, Centrinės ir Vakarų Europos išimtinis atvejus ir reiškiniu, transformuojantis visuomenėms.

Beveik 20 m. Rytų Europos, ypač Baltijos valstybių, raida nuo „išvystyto socializmo“, „planinės ekonomikos“ iki postmodernių Europos valstybių sąjungos skatina išsiaiškinti lyčių lygybės, kaip vienos socialinės politikos dedamųjų, pažangą ES kontekste. Viešoji lyčių lygybės politikos sistema tapo daug modernesnė, tačiau privati gyvenimo sritis (šeima, asmeninis gyvenimas) vis dar lieka itin tradicinė. Prieštaringos lieka aukštos moterų darbo inžineriniuose ir technologiniuose sektoriuose aprėptys, kurios yra posocialistinių (pokomunistinių, pototalitarinių) valstybių intelekto paveldas.

Šiame straipsnyje aprašomas tyrimas, kuriuo siekiama išnagrinėti kompleksines sąveikas tarp nacionalinio, regioninio ir europinio konteksto, hegemoninių diskursų, institucinių praktikų atsižvelgiant į lytį. Šis tyrimas buvo grindžiamas Michel Foucault „hegemoninės institucijos“ diskurso tradicija ir remtasi socialinės epistemologijos pagrindu.

Tyrimas atliktas remiantis Europos Komisijos 6 Bendrosios programos finansuotu mokslo projektu „PROMETEA: Empowering Women Engineers in Industrial and Academic Research“. Projekto tikslas – geriau suprasti lyties poreikius, problemas ir mokslinės karjeros galimybes inžinerinių ir technologinių

tyrimų srityje, kur moterys tampa socialine mažuma, ir pateikti efektyvias rekomendacijas, įgalinančias palengvinti moterų mokslininkų karjerą Europos valstybių akademinuose ir pramonės tyrimuose.

Projekto konsorciame Šiaurės Europą atstovavo Lietuva, Suomija ir Švedija, Pietų Europą – Graikija ir Ispanija, Centrinę Europą – Austrija, Slovakija ir Vokietija, Vakarų Europą – Prancūzija ir Didžioji Britanija. Kitos konsorciumo atstovės, pvz., Serbija įtraukta kaip turinti perspektyvią galimybę tapti ES nare, Rusija papildė Rytų Europos pokomunistinių valstybių imtį projekte. Slovakija ir Lietuva kaip dabartinės ES narės, vykdančios naudingą bendradarbiavimą, gali būti lyginamos lyčių lygybės pažangos kontekste. Visos valstybės yra pototalitarinės, pokomunistinės, su skirtingu socialiniu, ekonominiu ir moksliniu išsivystymo lygiu. Pvz., Čilė – besivystanti šalis su giliomis europinėmis tradicijomis Lotynų Amerikoje.

Iš projekto PROMETEA išryškėjo, kad, vertinant moterų mokslinės karjeros inžinerinių ir technologinių tyrimų srityje ypatumus (skirtingose kultūrose skirtingi kriterijai norint gauti paaukštinimą, nerasta didelio kiekio karjeros kelio kaitos faktų, nėra karjeros perėjimo, jungiamųjų grandžių, aptiktos kliūtis moterų karjeros raidai), sėkminga moterų karjera dažnesnė akademinėje (aukštojo mokslo) aplinkoje, o gamybinėje mokslinių tyrimų sferoje moterys, turėdamos mažiau galimybių gauti paaukštinimą siekdamos mokslinės karjeros, dažniausiai renkasi vadybines pozicijas, taip pasitraukdamos iš jau užimtos mokslinės karjeros pozicijos. Taigi mokslinė moterų veikla pramonės srityje joms pačioms užkerta mokslinės karjeros kelią, atverdama vadybinės karjeros perspektyvą. Sėkmingą vadybinę veiklą ir mokslinį darbą joms derinti yra labai sunku. Nors projekte turėta ne itin daug duomenų, tačiau paaiškėjo, kad pramonės srityje žmogiškieji ištekliai valdomi efektyviau, aplinka palankesnė jaunų tyrėjų ir lyties poreikiams.

Tokiose posocialistinėse (pokomunistinėse, pototalitarinėse) valstybėse kaip Lietuva rasta nemažai moterų mokslininkų, kurios jaučiasi „nugalėtojos tarp pralaimėtojų“, nes po SSSR žlugimo pirmiausia atsirado daugiau karjeros tobulinimo, tarptautinio bendradarbiavimo galimybių, tuo labiau, kad buvusi sovietinė ideologija – sovietologija – aukštino lyčių ideologiją, o ne lyčių sąmoningumą. Rytų Europos šalims, įstojus į ES, pokomunistinė demokratizacija

suteikė daugiau galimybių moterims mokslininkėms ir viešosios lyčių lygybės politikos plėtrai. Dar kartą patvirtintas aukštas lyčių lygybės suvokimo lygis, užtikrinantis geresnę moterų padėtį moksle Šiaurės šalyse (Švedijoje, Suomijoje): stiprios moterų asociacijos, modeliuojami nauji moterų ir vyrų vaidmenys šeimoje, intensyviai dirbama darbo ir šeimos derinimo srityje, nors prieš keletą dešimtmečių Suomija pasižymėjo gana žemu moterų išsilavinimo lygiu. Vokietijoje ir Austrijoje stebimas aukštas lyčių lygybės suvokimo lygis, tačiau moksle akivaizdžiai dominuoja vyrai, vis dar pasireiškia tradicinė lyčių karjeros reprezentacija. Prancūzijoje pastebėtas menkas lyčių lygybės svarbos suvokimo lygis, neigiami lyčių poreikių ir interesų skirtumai. Labai įvairuoja lyčių karjeros situacija Didžiojoje Britanijoje, Ispanijoje ir Graikijoje. Visose ES šalyse matyti aplinkos, darančios įtaką moterų mokslininkų karjerai, panašumai: aukštesnės ir greičiau įgyjamos kompetencijos poreikis, didėja reikalavimai mokslininkų kvalifikacijai (daugiau publikacijų, sutarčių ir paraiškų, profesinio lankstumo, didėja darbo krūviai ir viršvalandžiai), mažėja darbo vietų, nedideli atlyginimai, nors jie priklauso nuo šalies gerovės. Visose šalyse moterims mokslininkėms kyla sunkumų, nes institucijos jas mažiau palaiko, tyrėjos yra mažiau integruotos į mokslinius tinklus, joms prieinami menki išteklių, visų pirma – finansiniai, t. y. jos mažiau laiko gali skirti moksliniam darbui dėl nemažų administravimo ir akademinio darbo krūvių. Be to, kai kuriose šalyse moterų nepalaiko jų šeimos nariai (Lietuva – išskirtinis atvejis: mūsų šalyje moteris, priešingai, yra palaikomos, joms padeda šeimos nariai), jos patiria mobilumo problemą, apsunkintas prestižinių mokslo pareigybių prieinamumas.

Reikėtų pritari ir priskirti Lietuvą prie Šiaurės Europos regiono – Švedijos, Danijos, Suomijos, Norvegijos, kurio šalys laikomos ekonomiškai stiprios, socialiai atsakingos ir demokratiškos. Taigi mokslinis lyčių lygybės moksle skatinimas, bendravimas, ryšiai ir darbas tinkluose su Šiaurės Europos valstybėmis

taptų natūralus procesas²³, tobulinantis viešąją lyčių politiką Lietuvoje. Dabartinė Lietuvos situacija yra specifinė ir individuali, nes socialistinės lyčių lygybės ideologijos rezultatų realizacija tradiciškai yra archetipinė, lyčių stereotipai ir technologinės visuomenės vertybės yra modernios ir laisvos rinkos keitimosi stadijoje. Dar sovietiniais laikais moteris tuometinėje SSSR atliko dvigubą, kartais kontroversišką, socialinių-profesionalų vaidmenį. Kai nacionaliniame lygmenyje praktiškai buvo realizuojamos socialistinės feminizmo idėjos, moterims buvo priskirtas aktyvus vaidmuo gamyboje, politikoje ir visuomenės gyvenime.

Beveik 20 m. Lietuvoje, kaip ir kitose Rytų Europos valstybėse, vyko permainos: nuo išvystyto socialistinio komunistinio režimo, „planinės ekonomikos“ liaudies ūkyje pereita prie kapitalistinės, laisvosios rinkos ir socialinės gerovės režimo. Lietuvoje **viešoji lyčių lygybės sistema modernesnė, tačiau privati sistema (šeima, asmeninis gyvenimas, darbo ir šeimos suderinamumas) ir patriarchalinės visuomenės stereotipai išsiskiria kaip itin tradiciniai, todėl Lietuvos kaip pokolonijinės valstybės traktavimą reikia atmesti.**

Moterims mokslininkėms būtina kurti savo mokslinių tyrimų tinklus, į kuriuos reikėtų integruoti lyčių lygybės aspektą, remiantis tarpdiscipliniškumu, daugiadiscipliniškumu, technologišku, taip pat ieškoti naujų finansavimo šaltinių, užmegzti ryšius ir pradėti glaudžiau bendradarbiauti su pramonės srities atstovais (geresnės sąlygos mokslinei, ypač eksperimentinei veiklai) ir įgyti net kelių mokslo sričių diplomus.

Lyčių lygybės diegimas mokslo srityje vyrams taip pat užtikrintų kokybiškesnį gyvenimą, nes jiems kiltų daugiau abejonių dėl tradicinių lyčių vaidmenų ir veikiausiai abi lytis paskatintų gyventi labiau visavertį gyvenimą, t. y. prisidėti prie šeimos, ugdymo ir globos veiklos kuriant bendrą europinę sanglaudą.

Pagrindiniai žodžiai: moterų ir vyrų (lyčių) karjeros kelias, inžineriniai ir technologiniai tyrimai, lyčių lygybė, rytų ir vakarų šalių dinamika.

²³ Geografiškai Lietuva yra Šiaurės Europos valstybė – taip buvo apskaičiuota Jungtinių Tautų pasaulio regionų ir valstybių geografiniame suskirstyme.