

Gender inequality in the field of science and research

Blanka Poczatková

*Vysoká škola Báňská – TU Ostrava
Ostrava, Czech Republic
E-mail: blanka.poczatkova@vsb.cz*

Pavčina Křibíková

*Vysoká škola Báňská – TU Ostrava
Ostrava, Czech Republic
pavčina.kribikova@vsb.cz*

Abstract. The article focuses on gender inequality in the field of science and research in the Czech Republic. The authors of this article present an unbiased view on women in science and research and they also point out that gender inequality still exists in Russia and the USA. Based on accessible statistical and information data (see references) that have been elaborated by synthetic-analytical methods, this article authors state their opinion to this topic.

Keywords: gender, feminisms, science and research, support, gender justice.

JEL Classification: J16, I23, H75

Received:
November, 2016
1st Revision:
December, 2016
Accepted:
March, 2017

DOI:
10.14254/2071-
8330.2017/10-1/19

INTRODUCTION

Nowadays, women are seen as not only mothers and wives, but they are also seen in working professionals in different fields. Process of transformation as it comes to perception of women is rather slow in many countries, it will take some time to make conditions, options and possibilities the same as men have in all aspects, fields and mainly in all parts of the world.

Although feminist issues are still publicly discussed, the share of women in managerial posts as well as in science and research is still insufficient worldwide, i.e. it is far from share of men.

Gender conception deals with social differences between women and men; it says that behaviour and characteristics being generally connected with women and men are not natural. On the contrary, these differences are formed by the society and culture, they can exist in many variations and can change and adapt within time. They differ mainly among particular countries and cultures. Gender inequality exists in almost all professions but this paper focuses on the field of science and research, and compares the situation in three countries – the Czech Republic, Russia and the USA. The field of science and research is

fundamental as it comes to the development and competitiveness of each economy; the focus on the use of women's potential in this area can bring significant competitive advantage (Poczatková, & Křibíková, 2016).

When trying to understand differences between woman and man position, current sociologists take knowledge into consideration gained from a monitoring of primitive tribes and their culture all over the world. Professor Munrock studied 224 cultures and pointed out differences in activities based on gender. He created the list of 46 activities and found out that those are very distinguished between men and women. For example, work with wood – in 104 of mentioned cultures it is man issue and only in 6 of them woman does it. As it comes to cooking though, this is certainly woman issue (in 158 cases), only 5 tribes involve only men to cook. By professor Munrock, among typical men activities fishing, boats construction, hunting, weapons construction and work with stone are. Women, on the other hand, deal with water carrying or e.g. grains grinding (Čermák, 2014).

Opinions vary as it comes to determined what it purely men's and what is women's issue. Since childhood, we are inculcated with most of activities and mother's approach towards opposite gender is important as well. Mothers usually behave differently to infants of opposite gender. There was experiment made – mothers were given infant dressed like a boy and then dressed like a girl. Those women took different approach to the children. They smiled more often to "the girl" and as for "the boy", mothers forced them to play with "boy toys" such as trains, cars etc. This way, our behaviour towards opposite gender develops (Oakleyová, 2000).

Gender it is concept referring to social differences between men and women and expressing that behaviour and characteristics generally connected to women and men are not inborn. Rather contrary to it, they are formed by society and culture, can exist in many variants and can change within time and adjust. They differ among particular cultures but there can also exist many variants within one culture (Křížková & Pavlica, 2004; Foltysová, Pavlík & Simerská, 2004)

Gender equality - Conception saying that all people have the same rights to develop their personal abilities and skills. This freedom guarantees that different needs and behaviour of both genders would be considered equal (the same support and evaluation) and that all can do so without being limited by traditional gender roles (Osvaldová, 2004)

European Community formulated its social policy, based on which the basic documents of secondary right could be adopted and exist little changed up today. Important aspect was the fact that member countries agreed and started to harmonize social systems as well as regulations (Tomeš & Koldinská, 2003).

Křížková et al. (2011, p. 25) says that "the main differences of wages, differences between men and women are: as it comes to rate and type of human capital, rewarding for the same work, choice of work type and accessibility of work types".

Wage discrimination is very closely connected to above described gender segregation because it represents one of the main differences of wages levels at the labour market. It is generally valid that strictly men's jobs or jobs where men prevail are financially better evaluated. Connection of wage discrimination and gender segregation is inseparable. Consequences of such connection are very serious – they cause lower life level of some groups of women or causes children poverty (directly based on mothers/women disadvantaging) (Havelková, 2007).

Charter of Fundamental Rights and Freedoms serves as the basis to define equal opportunities of women and men; it guarantees the basic rights and freedom to all not considering skin colour, race, religion, language, social and national origin, family line, property, ethnic or national minority, political or other opinions and other positions. And further it says that everyone is free to decide on his/her nationality and nobody can be limited on right to execute basic rights and freedoms (Ciprová, 2011).

Women are continuously educating themselves in their branches. They are characterized by particular desire to be acquainted with more and more things. Contrary to men, they can creatively solve some problems in business. It is not truth that women are driven by emotions either in business or in their lives. Researchers have found out that women can control themselves more than men, and because of that they are better suitable for managerial positions. Above that, women are able to find more accurate solutions faster. They can sooner see possible problems on the professional way and can either solve them or go around (Giddens, 2001).

The company will benefit from gender equality in the workplace. Companies that leverage the full talents of the population have a competitive advantage. Employees on diverse and inclusive teams put in more effort, stay longer, and demonstrate more commitment.

The aim of the article is to point out the gender inequality in the field of science and research in the Czech Republic as well as based on accessible statistical information also in the USA and Russia as the significant world powers. Scientific researchers work in a broad range of industry, such as university lab, government, and private organizations. Researchers deal with or manage projects involving conception or creation of new knowledge, products, process, methods and systems. Mainly scientists, mentally working professionals, managers of scientific and development departments are considered.

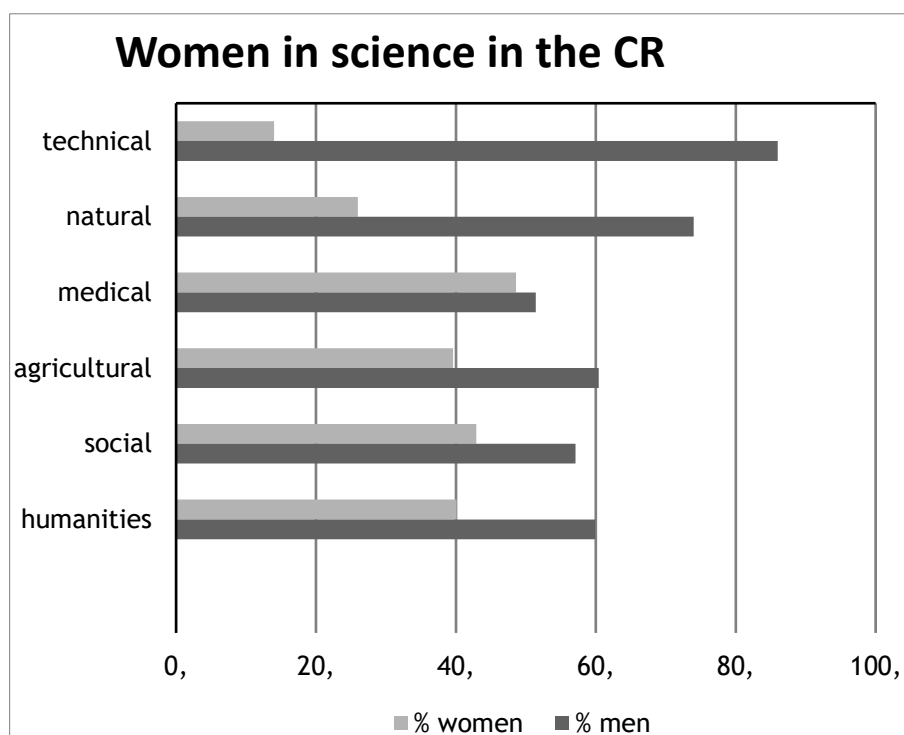
Statistical data have served as the fundamental references of information thus secondary references from various field.

1. WOMEN'S ENGAGEMENT IN SCIENCE AND RESEARCH IN THE CZECH REPUBLIC

The Czech Republic does not have equal opportunities for women in the science sector as compared to other countries in Europe. While the number of researchers is increasing continuously as well as the number of women in education, within the last decade, the percentage of female researchers has not changed at all.

Despite the increasing number of women studying natural sciences at the master and doctoral level the share of women researchers is the lowest one and stagnates or even decreases. The science sector in Czech Republic does not use its potential to hire well qualified female scientists. Developed countries are aware of the fact that higher share of women in science is a condition of sustainability and contributes to the advancement of expertise and global competitiveness. In the Czech Republic, natural, technical and agricultural sciences reported the biggest loss of women finishing their doctoral studies but they do not become scientists. These fields are less able to employ qualified women. Medical sciences are the only discipline where share of women and men is balanced (49,4%) and have been increasing since 2001. (Český statistický úřad, 2015) The worst situation is in technical sciences. This field reports decrease since 2001 and employs 14,5% of women.

As for the share of women in science, the Czech Republic holds last places in the research and business in international context. Graph 1 shows the share of women and men in the research in the Czech Republic within 2000 – 2013. It is clear that men prevail unequivocally.



Graph 1. Women in the research in the Czech Republic within 2000 – 2013

Source: Český statistický úřad, 2015, own elaboration.

Out of the *Table 1*, it is clear that in bachelor and magisterial study, women prevail but in doctoral study their share decreases and this trend continues also in the research sector; high academic positions are mainly held by men (Český statistický úřad, 2015).

Table 1

Representation of men and women at various levels of education (year 2013)

	Middle school	High school	University			Research career	Top academic achievement	Career achievement Nobel Prize
			Bachelor	Masters	Doctorate			
Men	45%		41%	40%	56%	69%	85%	x
Women	55%		59%	60%	44%	31%	15%	x

Source: Český statistický úřad, 2015, own elaboration.

Authors assume that this development can reflect the fact that women often choose maternity leave after magisterial study and thus their comeback to science and research is difficult or they do not return to this field at all.

1.1. Differences in reward system in the Czech Republic

In professions connected with research, there are still huge differences as for wage. The average wage of women specialists in scientific and technical positions achieves 80,6% of their men-colleague's wage. Gender wage difference (calculated out of average monthly gross pay) accompanies woman's professional life from the beginning of her career till her retirement.

Different rewarding of men and women is obvious. This problem involves science, research as well as academic carrier. Undervaluation of women leads to their frustration and loss of interest in trying to advance in their careers; women also often give up their profession. Despite the fact that European law considers the unequal rewarding direct discrimination, it still exists.

By the data of the Czech Statistical Office of July 2014, 26% of women work for the wage being lower than 13 770 CZK, but only 15% of men. Women start with the wage of 1 000 CZK less than men's; in the beginning, their income increases but when they take maternity leave around the age of thirty, it gets difficult for them to get a raise in their income. Czech women earn by 22% less per hour than men. (Technologická agentura ČR, 2015)

Gender wage differences are considered the result of more factors connected with gender inequality in the labour market – gender segregation, discrimination in terms of rewarding systems being set by employers. In the Czech Republic, difference between the wage of men and women working at the same position in the same company is more than 10%.

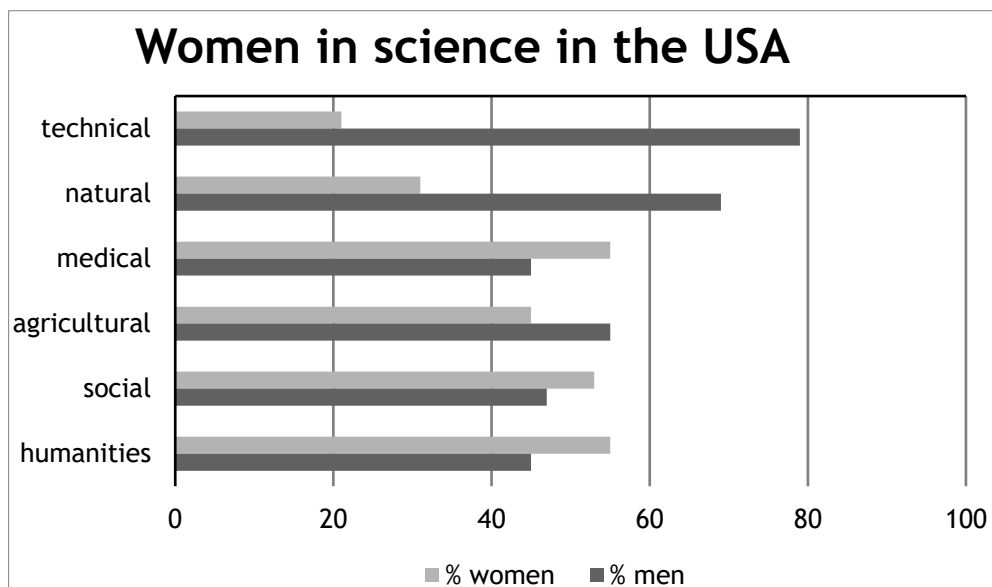
Economists and politicians have started to recognize that the labour market has limited skilled and talented women in several industries. It is necessary to bring them back to the labour market though, enable them to start their carrier even after maternity leave, make their wages equal with men's ones. In case some women would return to work immediately after maternity leave, economical performance could increase by 5bil CZK. (Technologická agentura ČR, 2015).

2. WOMEN'S INVOLVEMENT IN SCIENCE AND RESEARCH IN THE USA

The United States has the same issue when it comes to gender inequality in the science sector. There exists so called white collar discrimination. By this collocation, discrimination in science is meant. According to recent studies (Education Rankings & Advice, 2016), American laboratories close the door to university women-graduates to join their work force. At the same time, it is important who manages particular lab. If it is a man, the chances of young woman are very low. Especially, laboratories managed by men employ by 22% less of post-doctoral women and by 11% less of university graduates than laboratories managed by women. Above that, chances of young women-scientists decrease together with the increasing prestige of given working place. So, although the number of women-graduates with a doctoral degree of natural sciences increased from 15% to 52% within 1969 – 2009, the share of women at professorial level achieves only 18%. It is one of so called glass ceiling forms; if women-graduates would not be employed in the laboratory they would have no chance to cooperate neither with well-known professionals in the given field, nor participate in the scientific researches; this fact prevents them to develop their career or open their own laboratory or manage their own research. Gender inequality in science starts already during bachelor study and it gets worse during post graduate studies. (Education Rankings & Advice, 2016)

Female scientists are concentrated in other fields than men are. Relatively high share of women is in humanities (55%), social sciences (53%) and biological and medical sciences (56%). Low percentage of women can be found in technical fields (21%). Women make up 47% of total labour force in the USA

though, but their share is much lower in particular scientific and technical jobs. (National Science Foundation, 2013).



Graph 2. Women in science in the USA (2013)

Source: National Science Foundation (2013), own elaboration.

Table 2 shows the difference in the total number of female and male at a Bachelors’ and Masters’ levels, and from PhD programmes in 2013. Men significantly prevail since bachelor study and with each higher degree the difference is bigger. It can be said that only 11% of women achieve the high academic post and this number is very low. (Education Rankings & Advice, 2016)

Table 2

Representation of men and women at various levels of education in the USA

	Middle school	High school	University			Research career	Top academic achievement	Career achievement Nobel Prize
			Bachelor	Masters	Doctorate			
Men	51%		68%	70%	75%	71%	89%	97%
Women	49%		32%	30%	25%	29%	11%	3%

Source: Education Rankings & Advice, 2016, own elaboration.

2.1. Differences in reward system in the USA

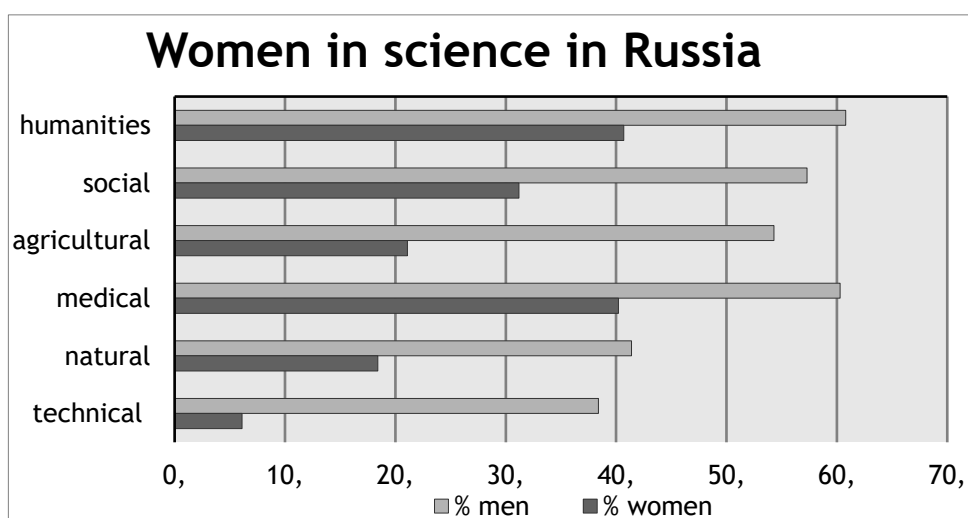
There is also a difference in rewarding systems among men and women working in the same position. Women in science and engineering have to face prejudice and old institutional structure; generally, men’s work is considered more quality. Regarding the applications for grants, men have statistically significantly higher probability to get it than the same qualified women do. Women in science and engineering earn on

average 71.845\$ per year while men earn 86.214\$. Women working full-time in Science and Engineering professions earn on average 84% of men's earnings (National Science Foundation (2013))

3. INVOLVEMENT OF WOMEN IN SCIENCE AND RESEARCH IN RUSSIA

As for Russia, men also prevail in the field of science. Women represent only ¼ of the scientific community. There are about 10% of women among university professors and less than 5% among the members of Academy of Sciences. (Science and Technology, 2015)

Considering the number of female scientists, as situation in Russia is much more favorable as compared to other countries. The science and technology field in Russia consist of 42% of women. Such high percentage is given by women's engagement in humanities and pharmacology.



Graph 3. Women in science in Russia (2010)
Source: Science and Technology, 2015, own elaboration.

In natural sciences (such as chemistry and biology), women make up about 20% of all workers, 40% of women work in medical sciences and about the same percentage in humanities.

Table 3

Representation of men and women at various levels of education in Russia

	Middle school	High school	University			Research career	Top academic achievement	Career achievement Nobel Prize
			Bachelor	Masters	Doctorate			
Men	x		x	x	57%	58%	90%	x
Women	x		x	x	43%	42%	10%	x

Source: Science and Technology, 2015, own elaboration.

Table 3 includes only data of a given topic, which could be traced. Presented data show that as for doctoral studies and academic posts, the situation in Russia is very similar to the one in the Czech Republic.

3.1. Differences in reward system in Russia

In Russia, difference between women and men wages has decreased 3 times within last five years but this difference is still high and men prevail in managerial posts.

By World Economic Forum, Russia holds 53rd place of 145 participating countries as far as differences in wages are concerned between men and women. Russian women get generally by 30% less wages than men at the same posts. However, women's ignorance can be the problem here because they expect the wage to be by 20 – 30% lower than men's is. As for particular professional fields, differences represent 8% in marketing and advertising, 11% in public sector, 13% in engineering, 20% pharmacology and 25% in education. (News in Russia (2016) The biggest difference is in IT area – up to 33%. Strong stereotype is still winning – men are considered the breadwinner, while women's income is not considered to be fundamental in financially supporting their families.¹

4. GENDER INEQUALITY IN SCIENCE AND RESEARCH

The authors have used social-scientific research and comparison method. Involvement of women in science and research in the selected countries has been compared. To evaluate inequality between men and women in science and research, there have been chosen independent entities, namely the Czech Republic, Russia and the USA. Comparing criteria have been determined factually, by space and by time. Based on the research results, conclusion can be stated that even developed countries do not respect gender equality (Technologická agentura ČR, 2015).

Table 4

Comparison of selected criteria (2010-2014)

Criterion/Country	the Czech Republic	the USA	Russia
Ratio of men and women of productive age	0,95	0,97	0,86
Percentage of women in science and research	31 %	29 %	42%
Percentage of differences in wages	10 %	18 %	30 %
Trend of women's involvement in science and research	decreases	increases	increases

Source: own elaboration

Table 4 shows weak engagement of women in science and research. The result of the USA is interesting because the percentage of women's involvement in science and research is the lowest one being 29%. The Czech Republic's result is better by 2%. At the same time, the ratio of men and women of productive age in the selected countries is comparable, there are any big differences seen.

Regarding the differences in wages, the biggest gap can be found in Russia – up to 30%. Although the Czech Republic shows the best results, difference 10% indicates gender discrimination. Gender pay gap in EU gets of average 16%; the Czech Republic thus holds the last places together with Germany (22,4%),

¹ News in Russia (2016). *The salary of women in Russia is 30% less than that of men.* <http://www.rcb.ru/news/274420/>, (referred on 02/21/2016).

Austria (23,4%) and Estonia (30%). Similar situation can be also seen in outside Europe countries, e.g. in Israel the difference of pay gap is also higher than 30%.

Based on above mentioned information, it can be said that the number of female university students increases but the number of women-scientist decreases. Significant difference is seen in percentage of studying women in the USA compared to the Czech Republic and Russia.

The number of women in professional fields decreases not only in technical and natural sciences but in humanities as well. Trend in women's engagement in science and research in the Czech Republic is rather not positive; contrary to it, it has decreasing character compared to the USA and Russia, where situation seems to be progressive.

Although gender issues may not be of importance when it comes to the quality of professional scientific work, they are. Gender inequality influences all aspects of scientific process, relationship at the working place, scientific language and finally, selection of research topic as well. It is not only about women's ratio in the fields and positions but it has to be mainly pointed out how alleged objectivity of scientific work is impacted by social and cultural context, in which it is created, and to increase awareness of this issue (Franklin, 2012).

CONCLUSION

Implementation of quota aiming to increase women's representation is being much discussed and very controversial tool. In EU countries, it is most often used to increase the number of women at public decision making posts and advisory bodies. Globally, implementation of quota is realized for such organizations assigning the grants from public finances and in decision making bodies creating scientific policy. The European Commission adopted the aim – 40% of women at all levels of implementation and management of scientific programs. Even trying so, some European advisory and decision making bodies are far away from this aim. This aim is to make fulfillment in some fields, in which share of women is traditionally higher – medicine, social sciences or relations between society and science. Nevertheless, in the Czech Republic, public debate on positive regulations for women in science is missing.

REFERENCES

- Ciprová, K. (2011). *Malé obce za rovné příležitosti žen a mužů*. Prague: Gender Studies. ISBN 978-80-86520-37-7.
- Čermák, J. (2014). *Postavení ženy ve společnosti se zaměřením na Českou republiku*. Retrieved from: <http://www.epolis.cz/nezarazene-clanky/33-postaveni-zeny-ve-spolecnosti-se-zamerenim-na-ceskourepubliku.html>. ISSN 1801-1438.
- Český statistický úřad (2015). *Researchers and technicians engaged in research and development by gender*. Retrieved from: <https://www.czso.cz/documents/10180/20541835/30000414k09.pdf/becfd294-d895-4e36-a43b-d31096fbab19?version=1.1> (referred on 08/19/2015).
- Education Rankings & Advice (2016). *Education*. Retrieved from: <http://www.usnews.com/news/stem-solutions/articles/2014/03/26/report-women-3-times-less-likely-to-become-scientific-researchers&prev=search> (referred on 02/21/2016).
- Foltysová, M., Pavlík, M., & Simerská, L. (2004). *Rozpočtování z hlediska rovnosti žen a mužů*. Praha: Ministerstvo financí. ISBN 80-85045-14-1.
- Franklin, L. (2012). *Gender*. Basingstoke: Palgrave Macmillan. ISBN 02-303-0273-4.
- Giddens, A. (2013). *Sociologie*. Prague: Argo. ISBN 978-80-257-0807-1.
- Havelková, B. (2007). *Rovnost v odměňování žen a mužů*. Prague: Auditorium. ISBN 978-80-903786-2-9.
- Křížková, A., & Pavlica, K. (2004). *Management genderových vztahů: Postavení žen a mužů v organizaci*. Prague: Management Press. ISBN 80-7261-117-8.

- Křížková, A. et al. (2011). *Pracovní dráby žen v České republice*. Praha: Slon. ISBN 978-80-7419-054-4.
- National Science Foundation (2013). *Employed scientists and engineers, by occupation, highest degree level, and sex: 2013*. Retrieved from: <http://www.nsf.gov/statistics/2015/nsf15311/tables/pdf/tab9-5.pdf>. (referred on 02/21/2016).
- News in Russia (2016). *The salary of women in Russia is 30% less than that of men*. Retrieved from: <http://www.rcb.ru/news/274420/> (referred on 02/21/2016).
- Oakleyová, A. (2000). *Pohlaví, gender a společnost*. Prague: Portál. ISBN 80-717-8403-6.
- Osvaldová, B. (2004). *Česká media a feminismus*. Prague: Libri. ISBN 807277-263-5.
- Poczatková, B., Křibíková, P. (2016). *Gender and women in business and science*. Saarbrücken: LAP Lambert Academic Publishing. ISBN 978-3-659-96628-6.
- Science and Technology (2015). *The Female Face of Russian Science*. Retrieved from: http://www.strf.ru/material.aspx?CatalogId=221&d_no=45603#.VsmfCn3hDcs. (referred on 02/21/2015).
- Technologická agentura ČR (2015). *Women in research and business*, <http://www.tacr.cz/index.php/cz/novinky/457-zeny-ve-vyzkumu-a-podnikani.html>. (referred on 72/13/2015).
- Tomeš, I., Koldinská, K. (2003). *Sociální právo Evropské unie*. Prague: C. H. Beck. ISBN 80-7179-831-2.