

Chapter 3

Taking gender seriously. Present trends and recommendation for scientific environment

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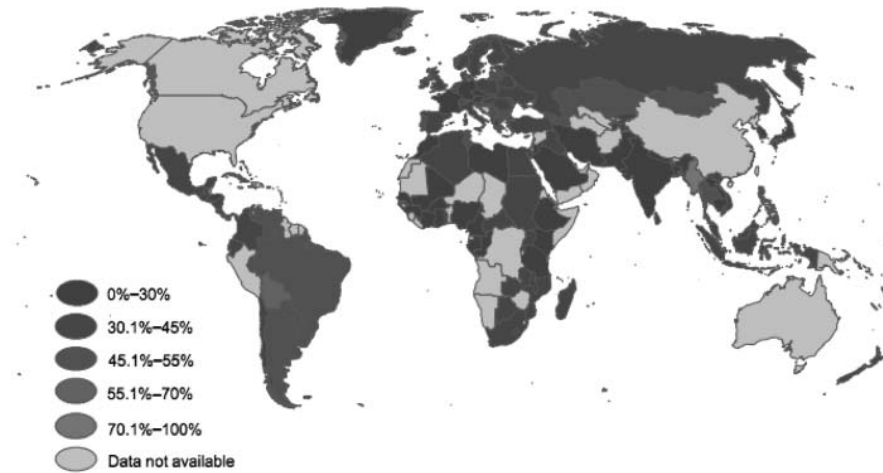
Abstract

This report deals with the issues of women's participation in the science and research sector. Analysis of the statistical data shows that both in the United States and in Europe, despite the fact that women make up almost half of those receiving a doctoral degree, among professors they are barely one-fifth. This issue is presented in geographical terms, divided into the countries of the European Union, Poland and Scandinavia. Common to them is the situation in which women scientists encounter more barriers than similarly qualified men on their career path. In Poland, too, despite a significant increase in the number of women studying at the further stages of the scientific career, the situation of women is not satisfactory. The last part of the paper is devoted to the policy of the Nordic countries in eliminating the phenomenon of gender inequality in the scientific sector. Although the countries in this region all run their own policy on gender balance in society, they are conducting a far-reaching consultation on a common strategy in this area, and action on gender equality in the Nordic scientific research sector is based primarily on anti-discrimination legislation. The solutions adopted in this region and the guidelines of European institutions will be treated as a kind of reference point for action to eliminate inequalities based on gender in the scientific sector.

Key words: science, gender, the European Union, Nordic countries, Poland

Introduction

In taking on the issue of equality considerations in science, it must first be noted that all the available statistics and research on a global, regional or national scale provide hard evidence of continuous underrepresentation of women in science. In almost all parts of the world the difference in the representation of women and men in the scientific environment is truly substantial. This situation is perfectly illustrated by the map given below, where we see sharp disparities and



Map 3.1. Women as a share of total researchers, 2010 or later available year

Source: <http://www.uis.unesco.org/ScienceTechnology/Documents/sti-women-in-science-en.pdf> [accessed March 2014].

under-representation of women scientists, even in some of the most developed countries – where the struggle for women’s rights and equality has been going on for decades, including France, Germany and Japan (where women represent less than one-third of academics).

The definition of scientist/women scientists or academics adopted for this report is in part proposed in the document entitled “Women in Science” prepared by the UNESCO Institute of Statistics, which states that a scientist is a person engaged in the creation of new knowledge, initiation and conduct of research, discovery of products, methods and systems, as well as the person managing such projects (UNESCO, 2012). Due to the nature of scientific work, those involved in teaching at universities, having degrees, and performing management functions in higher education institutions should also be included here. Higher education, according to the category adopted by Eurostat, provides a level of education offered by universities, colleges, institutes of technology and other institutions that grant degrees or professional diplomas (Eurostat, 2013).

This paper presents a descriptive analysis of secondary data contained in collected statistical materials (prepared by international and national institutions) and scientific studies. The content is divided into main sections, presenting the title issue observed geographically (World and the European Union, Poland, Scandinavia). Data presentation is enriched with tables and graphs. The methodology used in the study provides clarity and transparency of the presented material and provides an easy way to match readers’ interest in levels of gender representation and underrepresentation in the scientific community.

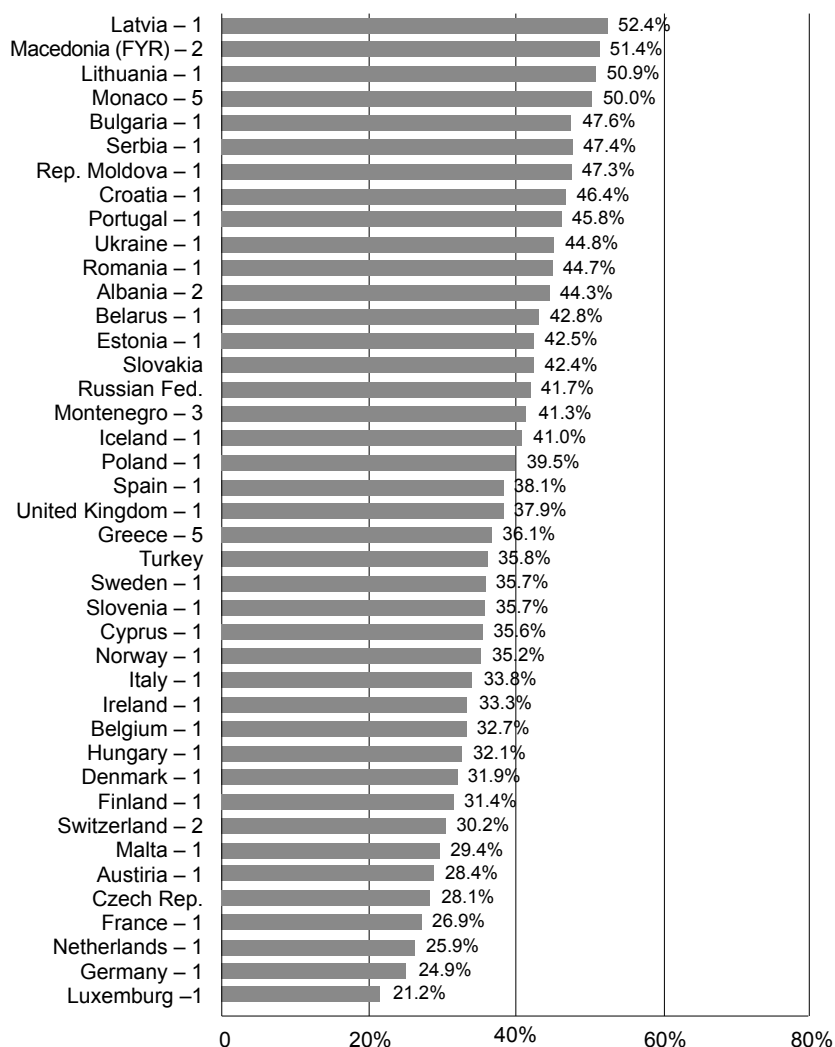


Figure 3.1. Female researchers as a percentage of total researchers, 2010 or later available year
 Source: <http://www.uis.unesco.org/ScienceTechnology/Documents/sti-women-in-science-en.pdf> [accessed March 2014].

3.1. The World and the European Union

A report prepared by Thomson Reuters in collaboration with Times Higher Education showing surprising levels of gender inequality in the world's top universities is unusually interesting. The Global Gender Index 2013 was prepared on the basis of data provided voluntarily by the scientific institutions included in the ranking of

top 400 universities in the world. According to the report, the biggest difference in gender representation is in Japan, where women make up only 12.7% of scientists in the top-rated universities in the country. Immediately after Japan ranks Taiwan, where only 21.3% of lecturers employed in seven national universities are women. Against this background, the United Kingdom (48 UK research institutions participated in the survey) is decidedly better, and women constitute 34.6% of the scientific staff. Right above the British we should note the United States, where the proportion of women is 35.9%, based on the 111 scientific institutions included. A country that comes close to achieving equal gender division is Turkey, where 47.5% of workers in the top five national universities are women. It is worth noting that we are still dealing with an scientific gender gap in the Nordic countries (often regarded as the most progressive in the world on issues of equality), and so, for example, women scientists in Sweden are 36.7%, 31.7% in Norway, and in Denmark 31% (Grove, 2013). Further information on the region can be read below.

It is worth noting also looking at a series of analyses of the phenomenon of discrimination against women in the scientific community included in a special issue of the journal *Nature* in March 2013 (Nature, 2013). This includes known markers that both in the United States and in Europe, women account for about half of those receiving a doctoral degree, but only one-fifth of professors. Despite some progress, women scientists continue to earn less, are less likely to be promoted, earn fewer grants, and are more likely to abandon scientific careers than similarly qualified men. Few women are invited to participate in the scientific advisory committees at various enterprises and companies. Also scientific conferences where even half the speakers are women are not a common occurrence. The question arises why is progress on gender equality in the education system not progressing? Motherhood is certainly one of the factors why women decide not to pursue a career. However, this is a practical question which in theory it is easy to deal with if the political will is there. There is, however, another, much more serious problem: overt or unconscious bias and stereotypical recognition of male and female roles. Unfortunately, such attitudes are even met among women scientists, and furthermore, common among those who actively promote learning as a women's issue.

Before we get into the presentation of statistical data on the proportion of men and women in science in the European Union perspective, it is worth considering the education system itself and the question of whether the underrepresentation of women is not the result of mistakes made at an earlier stage of education. This problem is presented clearly by the *Gender Equality Index* drawn up by the European Institute for Gender Equality (Gender Equality Index, 2013). One of the areas that are analysed is the area of knowledge, which clearly shows inequalities between men and women in the field of education and training. The analysis demonstrates that gender differences in education continue to occur, for example, if we take into account the preferences in the selection of courses studied and success achieved. The aim of the report was to measure the disparities in participation of women and men in tertiary education and learning. The results show that at the EU level since 2008 there has been a reversal of gender participation rates in education at

the higher level. Historically, more men than women achieved higher education, but since 2008, there has been a noticeable change in trends. Now, women predominate among people in tertiary education (Grove, 2013). In 2010, the percentage of women students (55%) and graduates (59%) were higher than the percentage of male students, but among PhD students and graduates men were more numerous than women (where the percentages were 49% and 46% respectively) (European Commission, 2013). Statistics on the underrepresentation of women and men in certain areas, such as education for men or engineering and manufacturing for women, however, remain mostly unchanged. This is important insofar as these differences translate into inequalities in participation in the labour market.

Analysing the situation of women and men in the scientific environment from the EU perspective, it should be noted that the promotion of gender equality is one of the key priorities identified by the European Commission for the European Research Area (ERA). The Commission sent Member States a recommendation for the removal of barriers to recruitment, retention in the profession, and career development for women scientists. The Commission is also trying to solve the problem of the gender gap in managerial positions in the higher education sector (European Commission, 2013). Current information on the situation of women in European science and research is contained in the report *She Figures 2012*, drawn up by the European Commission (DG. Research and Innovation and Eurostat) in cooperation with the statistical correspondents of the Helsinki Group on Women and Science.

The basic conclusions of this report can be summarized in a few points. In 2010, the proportion of women among those employed at universities was 45%, where (unfortunately) women accounted for 53% of the personnel of lower rank, employed as specialists or technicians; while women accounted for only 32% of teaching scientists and engineers; however, the share of women in activities related to research work was 44%. The data indicate a significant improvement over previous years, where, for example, in 2009, the share of women in research work was 33%. Also the percentage of female scientists is growing faster than men – corresponding to 5.1% in 2002–2009 for women and 3.3% for men. Among engineers an increase in the proportion of women on average by 5.4% per year (in 2002 and 2010) can also be seen, while the same rate for men is 3.2%. On average in the European Union, women account for 40% of all scientists in higher education (European Commission, 2013, p. 5).

In 2010 in the European Union, 46% of all PhD graduates were women. In the period 2002–2010 the average number of PhD graduates grew at a rate of 3.7% per annum (for men this rate amounted to 1.6%). In the same year the number of women PhD graduates outnumbered men in almost all fields of science, with the exception of: mathematics and computer science (40% female graduates), and engineering, manufacturing and construction (26% female graduates). In the years 2002–2009, women scientists generally gain in all fields of science and in the higher education system itself, but at a very different pace in different countries. The greatest progress has been made especially in the humanities, as well as in engineering and technology (European Commission, 2013, p. 5).

Table 3.1. Number of researchers in the higher education sector (HES), by sex, 2002–2009

	2005		2006		2007		2008		2009	
	Women	Man	Women	Man	Women	Man	Women	Man	Women	Man
BE	9 437	16 662	9 998	16 831	10 580	17 422	11 262	18 083	11 835	18 519
BG	1 451	2 443	1 446	2 463	2 022	2 895	2 210	3 095	2 839	3 736
CZ	5 633	11 148	5 949	11 222	6 493	12 175	6 619	12 391	6 878	12 541
DK	5 591	10 091	5 919	10 151	6 106	10 222	:	:	9 359	13 569
DE	52 272	122 351	57 968	126 404	62 675	128 936	67 381	130 470	74 816	140 658
EE	1 583	2 035	1 763	2 183	1 987	2 333	2 000	2 357	2 062	2 423
IE	3 630	5 870	3 852	6 216	4 070	6 530	4 493	7 117	4 605	7 295
EL	9 106	14 878	:	:	:	:	:	:	:	:
ES	41 376	67 447	43 318	69 757	45 959	72 810	47 689	74 478	49 790	75 340
FR	36 704	70 652	37 538	71 225	37 425	71 003	37 705	71 508	36 250	69 258
IT	24 311	45 876	25 721	46 683	26 482	47 257	27 507	47 433	29 170	47 915
CY	270	537	276	554	293	578	295	580	360	626
LV	2 259	2 109	2 533	2 412	2 889	2 523	2 985	2 683	2 631	2 417
LT	4 524	4 600	4 632	4 604	5 412	4 783	5 528	4 797	5 663	4 970
LU	54	151	67	192	75	212	124	243	197	353
HU	6 979	12 107	6 928	12 000	6 857	11 688	6 840	11 741	6 644	11 751
MT	181	495	191	523	179	530	214	554	183	438
NL	6 917	13 837	7 124	13 728	7 292	13 731	7 765	13 912	8 321	14 236
AT	:	:	8 190	15 419	9 465	16 502	:	:	10 965	18 074
PL	29 652	42 609	29 171	41 160	29 607	41 116	29 379	40 992	29 744	40 848
PT	10 025	11 359	11 383	12 661	12 741	13 962	21 497	24 959	28 715	29 166
RO	4 701	6 791	6 436	8 161	7 417	9 093	7 858	9 721	8 279	9 858
SI	1 291	2 273	1 374	2 235	1 348	2 275	1 619	2 545	1 723	2 508
SK	5 268	6 981	5 832	7 547	6 177	7 741	6 381	8 002	7 359	9 126
FI	8 088	10 407	9 226	11 141	9 471	11 099	9 612	11 036	9 987	11 463
SE	16 882	18 060	:	:	15 510	19 652	:	:	16 712	20 854
UK	106 839	148 210	:	:	116 018	155 342	:	:	124 310	159 967
HR	2 884	3 742	2 857	3 727	3 214	4 102	3 434	4 322	3 389	4 077
TR	25 968	41 536	27 770	43 249	31 654	47 466	32 308	47 875	33 802	49 479
IS	543	706	606	775	559	702	584	734	658	846
NO	7 121	10 966	:	:	8 349	11 463	8 877	11 713	9 392	11 923
CH	:	:	9 455	20 185	:	:	11 408	22 195	:	:
JP	63 407	232 069	66 584	234 609	68 738	233 754	71 402	234 445	:	:

Data unavailable: EU-27, EU-25, EU-15, MK, IL, US.

Break in series: DK 2007, IT 2005, SE 2005.

Others: „:” not available. Head count.

Source: Eurostat – Statistics on research and development (online data code: rd_p_persocc).

The *She Figures 2012* report also points out the major differences in the careers of women and men. The scientific career for women is characterized by a distinct vertical segregation. The percentage of women students (2010 – 55%) and graduates (2010 – 59%) were higher than for men, but men are overrepresented among PhD students and graduates (female students represent 49% and PhD graduates

46%). Moreover, women make up only 44% of the faculty of class C (postdoctoral), 37% of scientific staff Class B (with the degree of doctor habilitated) and only 20% of the Class A scientific staff (professors). It is easy to see that we are dealing here with a classic pyramid of inequality, where at lower levels, at the base, there is an overwhelming number of women. The underrepresentation of women is even more striking in the field of the hard sciences and technology, where the share of women increased from only 31% of the student population at the first level to 38% of doctoral students and 35% of PhD graduates. Among Class C scientists with degrees in the field of science and technology only 32% are women, in group B women account for 23%, while among professors they are only 11%. In general, the proportion of female professors is the highest in the humanities and social sciences, respectively, 28.4% and 19.4%, and lowest in engineering and technology – 7.9%. The estimated European Union indicator of the “thickness” of the glass ceiling in the scientific community in 2010 was 1.8, which is a slight improvement over the last few years, because in 2004 it was 1.9. Regarding decision-making bodies and management in 2010, the average in the European Union was 15.5% of institutions in the higher education sector directed by women, and only 10% of women held the position of rector. Women, on average, account for 36% of the members of governing bodies in higher education institutions (European Commission 2013b, p. 6).

In conclusion, there can be no doubt that the problem of inequality between men and women in the scientific community in the European Union exists, although the situations of individual countries varies slightly (the latter part of the paper presents the situation in Poland and the Scandinavian countries). The European Commission clearly indicates, however, that we cannot wait with arms crossed, hoping that women automatically “catch up” with men. A proactive policy is needed to reduce the existing inequalities significantly. The report highlights the necessity of finding solutions for combining work and family life. Interestingly, statistically scientific and research sector employees belong to the group that is still more likely to have children than those working in other industries. Hence, the question of the appropriate balance between work and home becomes crucial, according to the European Commission, in the creation of solutions for the scientific sector and equal opportunities for men and women in science (European Commission, 2013, p. 7).

3.2. Poland

Regarding Poland, it should be noted that since the early 1990s society’s level of education has been rising extremely fast, especially for women. In 2002, among people aged 15 years and more, the percentage of people who had incomplete basic, basic, completed secondary school, post-secondary or tertiary education with

a master's degree was higher among women than among men. Among women, however, there were fewer than among men who had the vocational and secondary vocational education. Among the population with higher education in the cities, women accounted for 54.0% (men – 46.0%) and 59.4% in rural areas. Among the total number of people with higher education, the participation of women increased in the period 1988–2002 from 47.0% to 54.8%.

At the same time, the percentage of women with secondary vocational education, general secondary, and post-secondary education decreased. The percentages of women with higher education were higher among those aged 20–49, calculated relative to the total number of women with higher education, than the men's percentages, calculated in relation to all men. Young men much more often than their female contemporaries had only incomplete basic education or no school education; 21.5% of men and 9.2% of women aged 15–19 in 2002. In total, 10.7% of women and 9.7% of men in Poland had a higher education.

Much greater differences occurred when it came to the group with basic vocational education. First of all, significantly fewer women had this type of education (17.5% of all women in Poland) than men (31.3% of all men). Poland is doing much worse when it comes to education of adults. The percentage of women was 5.4%, and men – 4.3% in 2005, while in Sweden, where the education of adults is most popular when it comes to EU countries, it came to 35.6% women and 27.9% of men. Slightly fewer people were educated in the UK, Denmark and Finland, where the percentages of women in education were a few percentage points higher than among men (CSO, 2007, pp. 24–25).

In the period 1990–2005, the number of Polish women students has increased fivefold; the number of men – fourfold. As far back as 1990 women accounted for more than half of all students. In 2005/06, they were 56.5% of the total student population and 65.0% of graduates. They were most strongly represented among students of medical schools (75.6% of the total enrolled in these universities), and teacher education schools (71.8%). Their percentage was the lowest among students of the Ministry of Internal Affairs and Administration (13.3%), Ministry of National Defence (23.8%) and higher technical schools (31.7%).

Comparison of the percentage of women studying various groups of subjects shows that the differences in the choice of directions are even greater when comparing the percentages of men and women than when compared to their presence in different types of schools. In the field of information technology in the school year 2005/06, women accounted for only 12.1% of the total enrolment. The courses included in the technical and transport services groups were still strongly masculine. Course that were already very feminine, such as social work, education, social, humanities, and biological sciences remained the same. There was a marked increase in the number of women in fields related to business and administration, as well as services to the population. It should be added that in the 1990s in general, the number of students in the fields of business and administration also increased significantly for men, due to the large employment opportunities in this area at this time.

The participation of women is even higher for postgraduate studies; in the school year 2000/01 they represented 70.6% of all students, and in 2005–06 – 68.4%. Poland had one of the highest rates of students in higher education among the countries of the European Union. In the school year 2003/04 there were 597.1 female students per 10 thousand of the total number of women, and 469.4 men per 10 thousand of the total number of men. There were higher rates for women in Latvia (635.3) and Finland (600.4). For men – in Finland (547.6) and Greece (527.6). In most European countries, such as, Germany, France, the UK, and Italy, the absolute number of students were similar to the number of students in Poland, but 10 per thousand women or men, they were significantly lower (CSO, 2007, pp. 24–25).

Table 3.2. Women doctoral studies by fields of science

Field of sciences	1995/96	2000/01	2005/06	1995/96	2000/01	2005/06
	in absolute numbers			in % of total participants in a given field of sciences		
TOTAL	3995	11315	16131	38,1	44,2	49,3
Natural sciences	1014	1896	2689	44,5	49,2	52,4
Technical sciences	299	1367	1506	15,8	23,6	28,9
Medical sciences	282	1017	1738	50,2	51,2	60,2
Agricultural sciences	306	1274	981	48,6	57,5	60,5
Social sciences	2094	5761	9217	40,9	48,9	51,6

Source: Central Statistical Office (2007), *Women in Poland*, Warsaw, p. 119.

During the school years 1995/96–2005/06, there was a large increase in the number of women in doctoral studies from 3995 to the 16 131. The balance between men and women also changed. In the school year 2005/06, they accounted for nearly half (49.3%) of those in doctoral studies. In particular, there were many doctoral students in arts and medical schools, and schools of physical education, where they accounted for more than 60%. Analysis by areas of science in the school years 1995/96–2005/06 differentiates courses of study to a more or less rapid increase in the percentage of women among doctoral students. In the case of science in areas such as life, medical, agricultural, or social, the percentage of women among doctoral students at the beginning of the period was 40% or more. This increased in the next few years to more than 60% in the case of medical and agricultural studies. They almost doubled in the case of technical sciences, showing that this field, traditionally regarded as masculine, is starting to change, but women still accounted for only a small group (CSO, 2007, pp. 24–25).

As a result of the changes, there was a systematic increase in the percentage of women receiving doctoral and habilitated doctor degrees. The number of women also increased from 22.4% to 27.0% of all those granted professorial titles in 1991–2005. Women were almost absent among members of the Polish Academy of Sciences. Their participation changed slightly over this period, despite the increase in the number of scientific staff at different levels. In 1990 they accounted for 2.2%

of the total number of members (10 people), and in 2005 – 2.7% (15 people). In 2005, women accounted for nearly half of the employees working in research and development (42.7%), 19.6% of all employees with the title of professor, 28.7% with a habilitation degree and 42.4% - as a doctor. It is easy to see that this share resembles a pyramid; reflecting the number of degrees and titles granted to women in previous years. Among those employed in research and development, women in Poland and other countries in Central and Eastern European countries were generally a higher proportion than in the old EU member states. In 2004, in Poland they accounted for 43.4% of total employment, while in Germany – 28.0%, the Netherlands – 23.6%, France – 32.4%, Sweden – 36.1%, Estonia – 48.6%, Latvia – 54.2%, and in the Czech Republic – 34.6%. For research workers, these differences were even more pronounced. In Latvia, in 2004 women accounted for 52.8%, Poland – 38.9% (CSO, 2007, pp. 24–25).

Table 3.3. Women employed in research and development activities by groups of posts

Occupation	2000	2005	2000	2005
	in absolute numbers		in % of total employment in a given occupation	
TOTAL	54326	52645	43,2	42,7
Researchers	33572	38426	38,1	39,3
Technicians and equivalent staff	10578	6613	52,1	47,3
Other supporting staff	10176	7606	59,4	65,8

Source: Central Statistical Office, "Women in Poland", Warsaw 2007, p. 120.

As shown by the data published by the European Commission in 2007, women accounted for 37% of scientists in Poland. This percentage is slightly higher than the average in the European Union, where it is 30%. In 2009, a slight increase was observed that at the European Union level was 33%, while in Poland it was 40%. Comparative data for the Poland and the 27 countries of the European Union in 2009, indicating the percentage ratio of scientific staff to the total labour force, shows that in Poland women in science account for 42% of all employed women, while among men it is only 25%. Among those with a doctorate, women account for about half (in the European Union this percentage is 44%), but for post-doctoral degrees it is 26% (for the European Union, this percentage is 37%), and for the titular professorship level reaches only 17% (in the European Union it is 20%). Even fewer women manage to take leadership positions in scientific research institutions: in the EU, women account for an average of 15%. In Poland, women are an exception at the position of rector: according to data for 2006, there were 3, and in 2009 - 4. As regards the remaining positions in the executive ranks of university, here also men predominate overwhelmingly: At the position of vice-rector in 2006 15.3% were women, and in 2009 – 17.1%. For deans, in 2006 9.8% were women, while in 2009 the ratio was 13.8%. The same trend can be observed in relation to the function of Deputy Dean: in 2006 it was exercised by 30.1% of women, and the situation was similar in 2009, with a slight decrease to 30%. Also in the case of

decision-making bodies in Polish science, the representation of women is around 7% (du Vall and Majorek, 2013, p. 3).

Statistics show that more Polish women than men gain a higher education, but in the later stages of the scientific career the situation of women is not satisfactory. Undoubtedly a positive impulse for the developments in the Polish science and research sector is the policy of the European Union. The Polish Ministry of Science and Higher Education is working with a special unit of the Directorate General of R&I (Gender and Ethics) in the context of the work of the Committee of the 7th Framework Programme *Science in Society* and the Helsinki Group (*Helsinki Group on Gender in Research and Innovation*). The promotion of gender equality, as has been indicated earlier, is one of the key priorities of the European Research Area (ERA). Thanks to the EU's policy, the Polish government and institutions responsible for the science and research sector are obliged to take action to remove the barriers to recruitment, retention in the profession, and the career development of women scientists and efficient use of their skills.

3.3. Scandinavia

Despite the undisputed leadership position occupied by the Nordic countries in the area of balanced participation of women and men in society, there are still spheres in which a gender imbalance is observable. Reference should be made to a field that is broadly understood as the scientific sector. Although the will to act in these countries is visible and the visions of its implementation widely discussed, there are still insufficient concrete solutions that would boost the numerical representation of women in the field.

The issue of gender equality in the scientific sector in the countries of the region became a subject of wider interest somewhat earlier than was the case in most European countries. However, the Nordic countries run their own policy on gender balance in society, and national differences in the approach to this problem are visible, and hence, in the perception of its importance and place in the list of political and social priorities of the individual governments. The scope of monitoring and political will to monitor the phenomenon of gender inequality in the scientific sector also varies from country to country.

Although so far no common mechanisms have been developed which would be implemented at the regional level, this subject is important to the extent that consultations on the implementation of joint strategies are carried out at the regional level. These consultations were initiated by the Norwegian Ministry of Education and Research, which at the moment of taking over the leadership of the Nordic Council of Ministers in 2012, directed the attention of Member States of the Council on the need to develop a strategy and the tools necessary to promote gender balance in the research sector in Scandinavia.

Within the Nordic Council of Ministers NordForsk operates, which is an organization that funds and coordinates research and scientific cooperation in the Nordic region, as well as providing consultancy in the field. In 2010 NordForsk accepted a submission that the gender perspective should be a factor in its funding of research programs: “NordForsk seeks to promote the participation of both men and women in the activities it finances and to increase the participation of the under-represented gender at any given time” (NordForsk, 2014). The Top-level Research initiative requires researchers applying for funding for research to demonstrate the extent to which they have taken the gender perspective into account in their application. Moreover, in 2012, NordForsk and the Secretary General of the Nordic Council of Ministers together with the European Commission adopted a Memorandum of Understanding, which refers to paying particular attention to issues of gender equality and gender perspectives in research (Geoghegan-Quinn, 2012).

In the 1970s and 1980s, a number of Nordic institutions of higher education, as well as leading research institutes, organized activities for gender equality, and implemented mechanisms to promote this idea in the coming decades. A characteristic phenomenon was the shift from the realm of recruitment mechanisms and activities aimed at women as individuals to the actual implementation of the principle of gender equality in the daily operation of scientific institutions.

Activities on gender equality in the Nordic scientific research sector are primarily based on anti-discrimination legislation. Crucial in this regard are the legal solutions to combatting discrimination on grounds of sex, and thus of equal treatment and neutrality of gender in the labour market and the provisions relating to equal pay. In each of the countries in the region in the basic law there is a clear formulation of *a prohibition against discrimination on the basis of sex*, followed by extension ordinary legislation which prohibits any difference in treatment of the sexes.

These same principles apply to the education sector, regardless of level. Both educational institutions and other actors in the labour market are obliged to promote gender equality through preparing reports on action carried out in this area over a given period, as well as submitting planned strategies to be implemented to the appropriate authorities. Such regulations apply also equally to universities and research institutions, so that in Denmark, Finland, Iceland and Sweden an employer of a certain number of employees, irrespective of the sector it represents, is obliged to draw up a plan of action in the area of gender equality. The form and extent of the detail of these plans vary from country to country. In addition, the obvious question arises as to what extent these plans have a real impact on the conditions in a specific workplace (Bergman and Rustad, 2013, p. 25).

Analysis of the effectiveness of such instruments should primarily take into account the issue of independence of research institutions, particularly universities, which have a wide range of autonomy and independence. And therefore, as long as there is no climate conducive to change towards greater gender balance within scientific institutions, regulation at the level of government will not bring the desired results.

This does not mean, however, that the ministries responsible for research and higher education have no impact on the policy of scientific institutions in the

field of gender balance. Due to the fact that modern scientific research and higher education more often go hand in hand with the need for the development of innovation, the ministries which are responsible for innovation and development in the broad sense, including economic, can also take more active part in promoting the idea of equality in the scientific sector.

In Finland, the broadly defined issue of equality is the responsibility of the Ministry of Social Affairs and Health, and implementing specific strategies in this regard is the responsibility of the following bodies: Ombudsman for Equality, the Gender Equality Unit and the Council for Equality (Ministry of Social Affairs and Health Finland, 2014). The Academy of Finland, which developed an Equality Plan for 2011–2013, is mainly responsible for funding research activities. In accordance with the regulations contained therein, the sex that remains in the minority should occupy at least 40% of the posts as researchers, experts and appointed members of working groups. The plan also provides that “if the percentage of the underrepresented gender falls below 40 per cent for the position in question, of two applicants who are equally qualified or only slightly differ in their level of qualification, the representative of the underrepresented gender shall be selected” (Academy of Finland, 2014). Most universities established a network of cooperation among their Committees on Gender Equality, and the University of Helsinki has appointed an Adviser on Gender Equality (Ruest-Archambault, 2008, pp. 72–73).

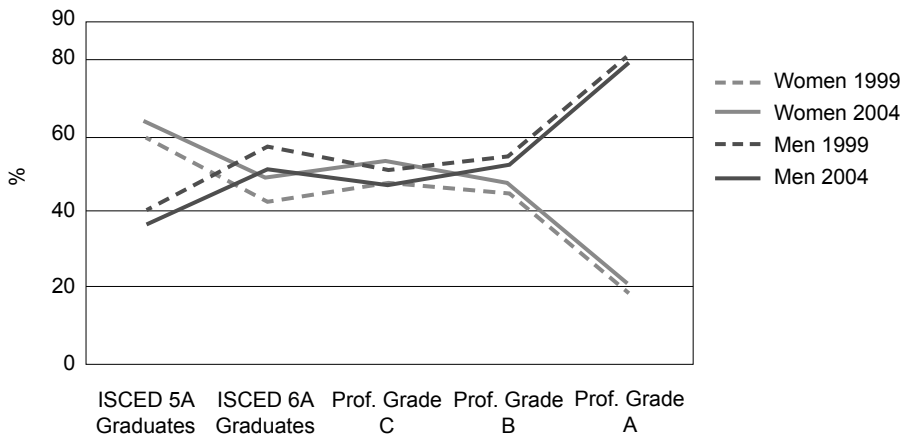


Figure 3.2. Relative share of women and men in a typical scientific career (Finland)

Source: E. Ruest-Archambault (2008), *Benchmarking Policy Measures for Gender Equality in Science*, Brussels: European Commission, p. 72.

In Denmark, however, the policy on gender equality in higher education is somewhat less restrictive. The Ministry for Gender Equality is responsible for the equality of opportunity in the broad sense, and the Ministry of Science, Technology and Innovation together with the Ministry for Gender Equality has established a *Think Tank on More Women in Research*. Its responsibilities include developing recommendations to increase the participation of women in science

and research (Pedersen, 2005, pp. 5-6). The Danes have not set up bodies responsible for monitoring the implementation of the principles of equality in scientific institutions. However, legislation has been amended to address this issue. And so, the amendments which were incorporated in 2011 into The Danish Act on Universities provide that the Ministry of Education and the specific university shall enter a 3-year agreement, known as a development contract, which can also include an entry on gender equality, but this is not obligatory, which should undoubtedly be regarded as a sign of respect by the executive for the autonomy of universities and their independence on the prioritization of their own development, including in the field of scientific staff (The Danish Act on Universities, 2011).

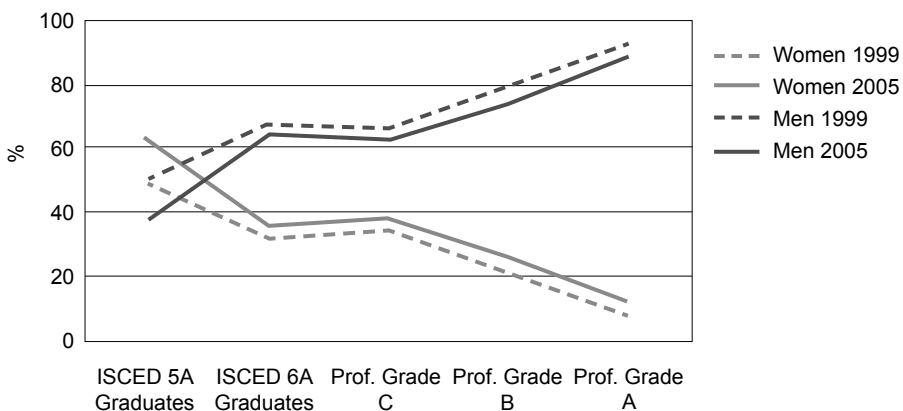


Figure 3.3. Relative share of women and men in a typical scientific career (Denmark)

Source: E. Ruest-Archambault (2008), *Benchmarking Policy Measures for Gender Equality in Science*, Brussels: European Commission, p. 69.

The Swedish government in turn has adopted a system of regulation (*regulation letters*), which includes requirements for the recruitment of professors and the obligation to submit to the competent authorities reports on the progress that the institution has made in the implementation of gender equality. It is worth noting that in 1997, the Swedish National Assembly set a target of achieving a proportion of women in professorial positions of professors in universities and colleges at a minimum of 36% in 2012–2015.

In Sweden, the issue of gender equality until 2010 lay in the competence of the Ministry for Integration and Gender Equality. After the election and the reorganization of the government the Ministry of Education and Research took over the responsibility for gender equality (Government Institutions in Sweden in 2014). The Swedish government established a Delegation for Gender Equality in Higher Education (2009–2011) in order to promote gender equality in the scientific sector, carried out a review implemented by research institutions and universities on activities in this field. This agenda has also initiated research on this issue, publishes reports, and organizes conferences and seminars. Until 2013, these

activities were supported by the Swedish National Agency for Higher Education, and they were subsequently incorporated within the competence of new bodies – the Swedish Council for Higher Education and the Swedish Higher Education Authority (Swedish Council for Higher Education, 2013).

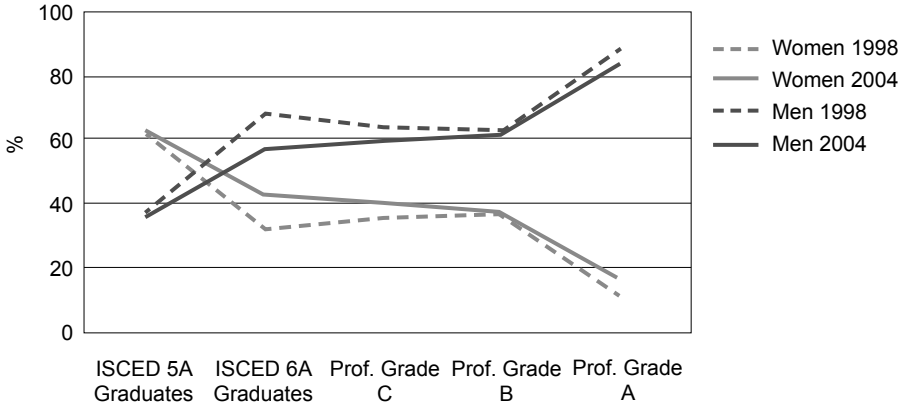


Figure 3.4. Relative share of women and men in a typical scientific career (Sweden)
 Source: E. Ruest-Archambault (2008), *Benchmarking Policy Measures for Gender Equality in Science*, Brussels: European Commission, p. 123.

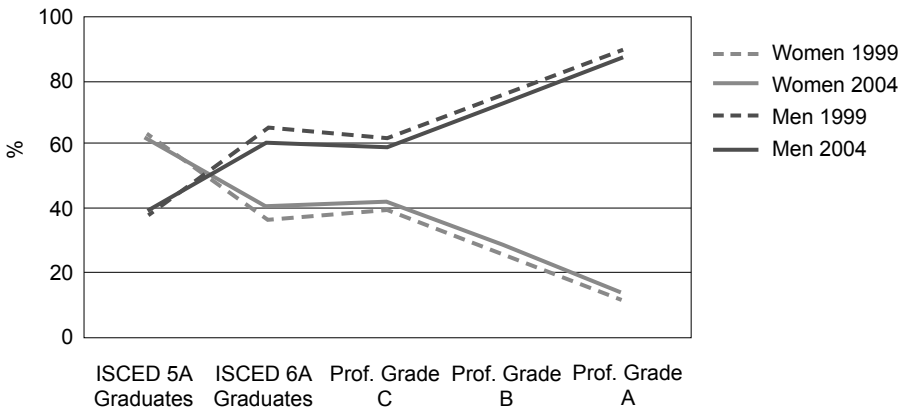


Figure 3.6. Relative share of women and men in a typical scientific career (Norway)
 Source: E. Ruest-Archambault (2008), *Benchmarking Policy Measures for Gender Equality in Science*, Brussels: European Commission, p. 139.

In Norway, attention should be paid to the Norway Committee for Gender Balance in Research, bought to life in 2004 and formerly bearing the name of the Committee for Mainstreaming – Women in Science. The name change, it seems, reflects the change of emphasis in the approach to gender issues in science, where in place of the integration of women into the mainstream of scientific life, the need has appeared to balance the presence and activities of women and men in the field.

Among the tasks that it is committed to, the Committee was to promote gender equality in the field of higher education and to provide universities and research institutions with recommendations, the implementation of which could be helpful in terms of achieving a better balance in this respect. One of the objectives of the Committee is also to raise awareness in society of the seriousness of the problem of the imbalance in the numerical representation of both sexes in the scientific sector (Committee for Gender Balance in Research Norway, 2014).

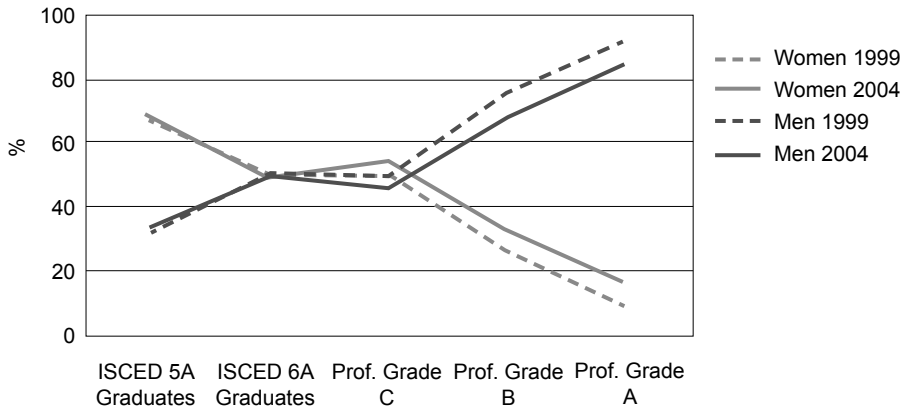


Figure 3.7. Relative share of women and men in a typical scientific career (Iceland)

Source: E. Ruest-Archambault (2008), *Benchmarking policy measures for gender equality in science*, Brussels: European Commission, p. 133.

In the case of Iceland, the Minister of Education, Science and Culture appointed a woman in science committee for their department in 2004. Its job is to monitor the implementation of gender equality policy, based on the government draft socially aware Women in Science, the implementation of which fell on 2004–2008 (Ministry of Education, Science and Culture Iceland, 2004). The Committee examines data on the presence and activities of women in the scientific sector, and identifies barriers to the implementation of the principle of equality, offering solutions in this area and suggesting desirable directions of reforms. In addition, Iceland has the Centre for Gender Equality, which is responsible for the implementation of the Act on the Equal Status and Equal Rights of Women and Men. As the *Parliamentary resolution on a four year gender equality action program* in 2011 states, in 2013 and 2014, those research institutions that demonstrate the greatest progress in the field of gender equality, will receive Equality Awards (The Centre for Gender Equality Iceland, 2011).

In the case of participation of women in research and committee councils a kind of balance is clearly noticeable, which places the Nordic countries slightly above the EU (in 2010 for the 27 EU member states this was 36%). The difference is noted with respect to the positions of rector, where in the case of the European Union in 2010 this amounted to 15.5%, and outside Denmark in all other Nordic countries this percentage is clearly higher.

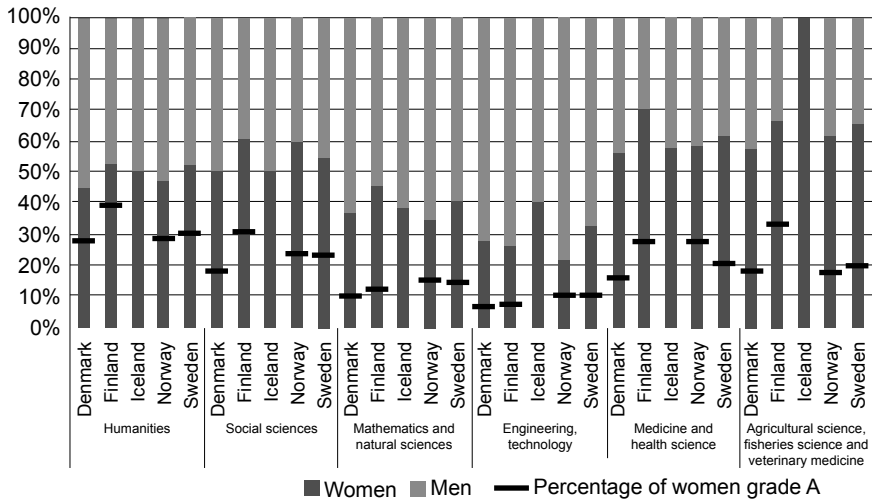


Figure 3.8. The percentage of doctorates broken down by gender and discipline and the percentage of women with a professorial title (grade A) in the Nordic countries (2010)
 Source: S. Bergman, L.M. Rustad (2013), *The Nordic Region – A Step Closer to Gender Balance in Research? Joint Nordic Strategies and Measures That Promote Gender Balance among Researchers in Academia*, Copenhagen: Norden, p. 21.

Table 3.4. Percentage of women and men on the research council boards and rectors at higher education institutions in the Nordic region in 2010

Country	Board representation (%)		Rectors (%)	
	Women	Men	Women	Men
Denmark	35	65	14	86
Finland	45	55	25	75
Iceland	40	60	20	80
Norway	46	54	32	68
Sweden	49	51	27	73

Source: European Commission (2012) *She Figures 2012. Gender in Research and Innovation*, pp. 115–117 [accessed 10.01.2014].

Among the factors that the Scandinavians themselves considered to be detrimental to the scientific development of women’s careers is the fact that, although the substantive criteria for evaluation of the work of women scientists are not in doubt from the point of view of their formal nature, the recruitment of researchers by higher education institutions has a much smaller range of formalism. Secondly, one of the essential elements of scientific life turns out to be a kind of informal network of social contacts, which may have a decisive influence on who takes the highest positions in the university. Such practices decisively favour men, due to the fact that on the one hand they constitute the majority in these bodies, and on the other hand are more at ease with self-promotion than women. Not without

significance is also the socially established role of women as mothers and carers, which due to the specific nature of the work of researcher inclines women to choose another career (NordForsk, 2013).

Conclusions

In conclusion, it is worth referring to the recommendations that have been formulated by the Norwegian Committee for Gender Balance in Research. These relate to instruments which, according to the Committee's experts, are necessary in order to achieve gender balance in scientific research. These instruments can be divided into two basic groups: structural and specific.

The first group includes: An appropriate personnel policy, affirmative action (positive discrimination), the establishment of day care centres for the children of women scientists, appropriate distribution of administrative tasks (including participation in decision-making), creating databases of women experts in particular areas, to promote the expertise and scientific experience of women, to prevent forms of sexual harassment, and consulting (Committee for Gender Balance in Research Norway, 2014). In turn specific actions might be: financial support for research projects or participation in international scientific exchange, training in the management of scientific and research institutions so that a greater number of women would consider this kind of activity, mentoring projects, campaigns encouraging women students to take up scientific careers (Committee for Gender Balance in Research Norway, 2014).

In the magazine *Nature* (Nature, 2013 <http://www.nature.com/news/specials/women/index.html>), we find the suggestion that one possible way to balance representation of women and men in the scientific sector is the introduction of quotas. This would be a good way to ensure young women starting a career in the world of academia had appropriate female role models and authority figures. Some believe, however, that this would lead to a situation where average or even less capable women would be promoted. However, this reasoning contains a certain inaccuracy. Women and men are equally talented. So, if men occupy most senior positions, how many "less capable" must be among them? Is the lack of talent in men more acceptable than in women? In turn, parity in decision-making committees brings the problem of imposing an excessive burden on those women who already work in them. The solution would be, at least for the moment, low parity.

Promoting gender equality in research and innovation is a serious commitment from the European Commission and is one of the basic principles defining the core of the Horizon 2020 Programme. One innovation in the Horizon 2020 programme is the inclusion of equality training to the eligible costs of a given activity. However, the most important goals should be, first, to ensure gender balance in research teams. In line with the European Commission Fact sheet issued in December 2013: Gender Equality in the Horizon 2020 (<https://ec.europa.eu/programmes/hori->

zon2020/sites/horizon2020/files/FactSheet_Gender_2.pdf), when signing a grant agreement, the beneficiaries are committed to promoting equal opportunities for men and women in the project. They will also be required, if possible, to ensure gender balance at all levels of employment in the project, including the supervision and management level. Secondly, care should be taken to ensure gender balance in decision-making processes. The European Commission requires the achievement of 40% representation of previously under-represented genders in each group, e.g. expert groups and evaluation panels. In advisory groups and committees gender parity (50/50) is required. In addition, each of the decision-making and advisory bodies in its composition must include a gender expert. Thirdly, an important recommendation for the R&D sector is the inclusion of gender/sex perspectives in the analysis and content of research and innovation. This means that each person applying for funding is required to describe how analysis related to gender and biological sex will be included in the proposed project. Subjects with a strong emphasis on gender/sex issues will be a priority.

It also seems reasonable to highlight, in accordance with the recommendation of the European Organization for Nuclear Research (CERN) for the United Nations (Izlar, 2013), three problems that need to be addressed in the process of equal opportunities for men and women in the field of science and research. The first issue relates to encouraging young women to take up careers in academia. Here it is extremely important to combat stereotypes at all levels: social, economic, and political. It is also important to increase the visibility of women scientists in the media, and make efforts to promote outreach in science careers, and thus to provide role models and mentors for young women.

Another issue is to increase the number of women employed in academia. In this respect, it is proposed to implement anonymous recruitment process, as studies show that in many cases the committees examining the application forms subconsciously favour male candidates, despite there being women candidates with similar or higher qualifications. It is also important to introduce fair rules for parental leave.

The last, very difficult, problem, is to keep women in academia and research. Here we can once again bring up mentoring programs and the promotion of the scientific career path, which can be served by the organization of scientific and networking meetings for women. Furthermore, broad discussion on gender issues is necessary at the numerous scientific meetings. This would help both men and women to realize the essence of the problem of gender imbalance and make a joint effort to solve the aforementioned problems.

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