

Sub-theme:

12.2 Role of government, industry and university policies in encouraging women in S&T education and careers

Title:

Women in Science: Education and career challenges in Hungary

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1. Introduction

“Academic science is the model for professional science. To rise in this system, one must climb an extraordinarily narrow ladder: from graduate student to postdoctoral fellow to research associate to assistant professor (or principal investigator). The majority of women in science have never completed that rise. They have remained research associates attached to the principal investigator for most or all of their working lives. The cause of arrest is multiple and it has a history.” (Vivian Gornick, Women in Science, 1990. p. 81.¹

In the XXth century there were radical changes in the status of women in Hungary. In the I. World War, compared to the earlier period, the number of women in higher education doubled, and starting from the mid 40s their participation in higher education has been significantly increasing. Besides education, following the II. World War, there has been a significant change in the labor market as well. Similarly to other ex-socialist countries, our country has rapidly adopted the dual-earner family model, based on new economic and technological developments, and in a social sense, on the maxim of equal opportunity for both genders.

In the past 65 years Hungary has undergone a lot of changes, but the position of women still remains controversial. Nowadays, 10-12% more women than men participate in higher education. However, having a degree in their case does not constitute a clear path to a good job, salary, career, scientific progress, or a paid job. The development evident in higher education is hardly felt in the labor market.

It is a worldwide phenomenon that men earn much more than female colleagues with a similar education. The differences in salaries typical for the past years in Hungary are slightly above the European Union average of 16%. The number of men worldwide occupying management positions is double that of women. In the influential positions in economic and political life we still encounter far more men, and as we proceed to the senior level the difference is growing.

The differences mentioned are also striking in all fields of scientific life. You can hardly find women in management in higher education and research institutions, both around the world and also in Hungary. As an example, consider the glass ceiling theory.²

How can we explain that the differences felt in higher education are not mirrored in the labor market? What are the obstacles that prevent women from the realization of a professional and scientific career? Is it irresolvable for women to combine their job, with career promotion, and family life? What are the tasks of government, society, and the responsibility of people in addressing the position of women? Why do women with degrees proceed more slowly up their career ladder? Why is there not a substantial change in the hierarchy between the two sexes in the field of scientific life? What is the role of gender stereotypes in sustaining this position? Can we overcome these prejudices that still exist in our society?

A number of research projects and essays have been dealing with the above mentioned questions. (Benchmarking policy measures for gender equality in science³; Enwise - Gender equality in a wider Europe⁴; Mapping the maze: Getting more women to the top in research⁵; The gender pay gap, origins and policy responses⁶; WS DEBATE project⁷ etc.)

The present study, due to a lack of outsourcing means, was not aiming to make a sociological survey of the concerned, and was not striving to change this situation. The aim of the authors was to contribute to a better knowledge of women's' role in scientific life and their opportunities, and to outline a multi-disciplinary approach formed on the basis of the most up-to-date data amassed in Hungary.

2. Methodology

While preparing this paper, the authors were mainly using two methods: to overview and examine the professional articles on the said subject and to collect, examine, evaluate and graphically illustrate the statistical data concerned.

3. State-of-the-art, findings and interpretation

3.1. Women in Hungary – an outline in the framework of the statistical data

In Hungary, there are 1105 women to one thousand men, which is 52% of the population. The life expectancy of girls born in 2009 was 78 years, 8 years more than our grandmothers' half a century ago. Hungarian women live 8 years longer than men. 51% of women between 15-64 years of age are employed, 8% are part-time workers (throughout the EU this rate is 31%). 66% of women are employed as intellectual workers and 34% in manual fields. The labour market does not value the labour of men and women equally; the average salary of men exceeds that of women by 17%.

Hungarian women are more ambitious in studies than most of their European counterparts: their rate of participation is 55-56%, compared to 55% in the European Union. The average age of women getting married for the first time and having children is 28 years. Women spend three-quarters of their life in a healthy condition. (Central Statistical Office (KSH), 2011).⁸

3.2. Female students in higher education

In Hungary, higher education Institutions were established at the turn of the XIVth and XVth century (in Pécs, Old Buda, Bratislava, and Transylvania), but women were only permitted to take part in higher education starting from the end of the XIXth century. In 1895, the culture minister allowed females to take part in higher education, mostly in the departments of philology, medicine, and pharmacology. But please note that only after the II. World War, in 1945/46, did all departments (except the theological and military officer's) become open to women.

The percentage of female students by the mid-60s reached 40% and two decades later it was already over 50%. The number of women who obtained diplomas between 1949 and 1990 has increased by a factor of twenty; according to the census in 1990, half of the women who graduated from higher education institutions were teachers. In the second half of the XXth century already 53.6% of full-time students in higher education were women, most of them studying at the departments of health (91.8%), health pedagogy (93.8%), pedagogy (85.2%) and nursery (92.2%).⁹

In the middle of the century, at full-time, part-time and correspondence courses of all higher education institutions, the number of "fairer sex" participants reached 60%.¹⁰ But following the 2005/2006 term, the number of female students decreased slightly, and thus their rate in the recently closed educational period reached just 55%. There were differences in the distribution between the departments. The percentage of women in full-time education was between 52-53%; a figure exceeded by 10% for women on correspondence courses in the last 5-6 years. (Table 1.)

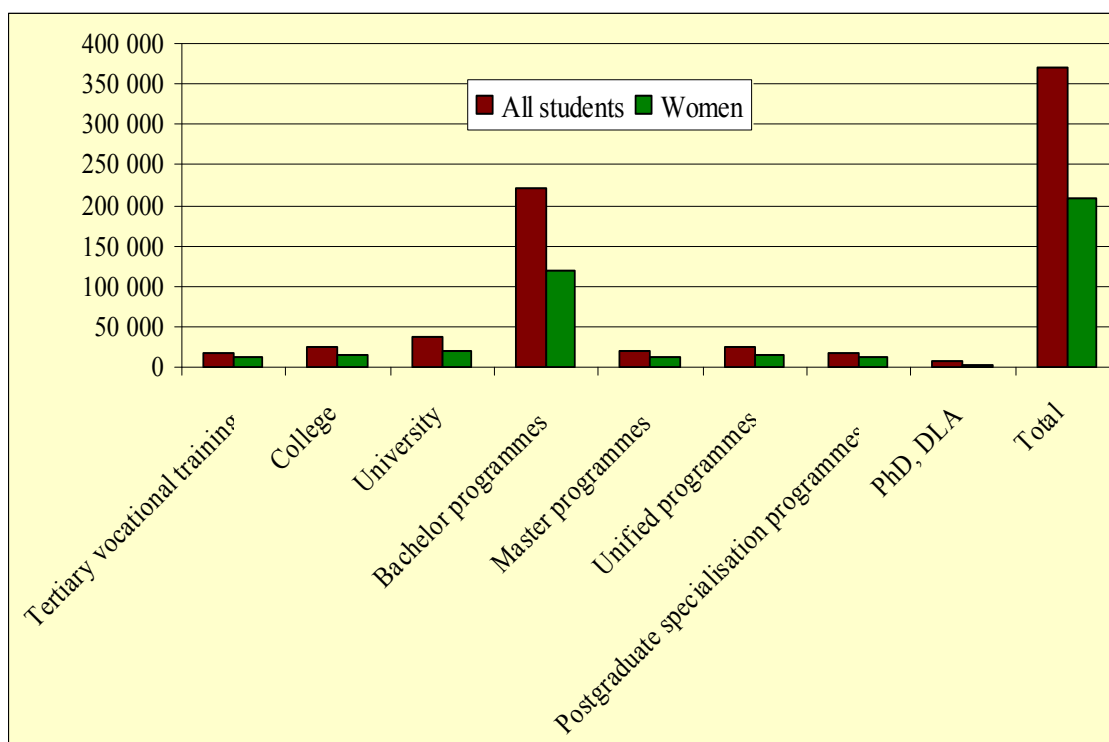
Table 1. The proportion of female undergraduates in higher education (college, university and unified programmes; bachelor and master programmes)

Year	Full-time	Part-time	Correspondence (+ distance courses)	Total
	courses			
2005/06	53.03	69.78	63.57	57.40
2006/07	52.96	67.88	62.88	56.70
2007/08	52.64	63.29	61.30	55.61
2008/09	52.56	59.52	60.58	55.13
2009/10	52.56	59.52	60.58	55.13

Source: Higher education statistics, 2009. Ministry of National Resources (NEFMI)

It's worth examining the ratio of female participation with respect to the various higher education forms. In the term 2009/2010, the total number of students studying in all fields of higher education was more than 370 thousand, and among them the number of women was 210 thousand. Their share in tertiary vocational training and postgraduate specialisation programmes was close to 70%. While in bachelor programmes 54% were women, the number of graduates from master courses exceeded 60%. Unfortunately, in the field of doctoral education (PhD, DLA), which is the gateway to a scientific career, the percentage of women was smaller; the students are mostly male (51.2%) for this term.¹¹ (Figure 1.)

Figure 1. The number of all students and female students in higher education in the 2009/2010 academic year

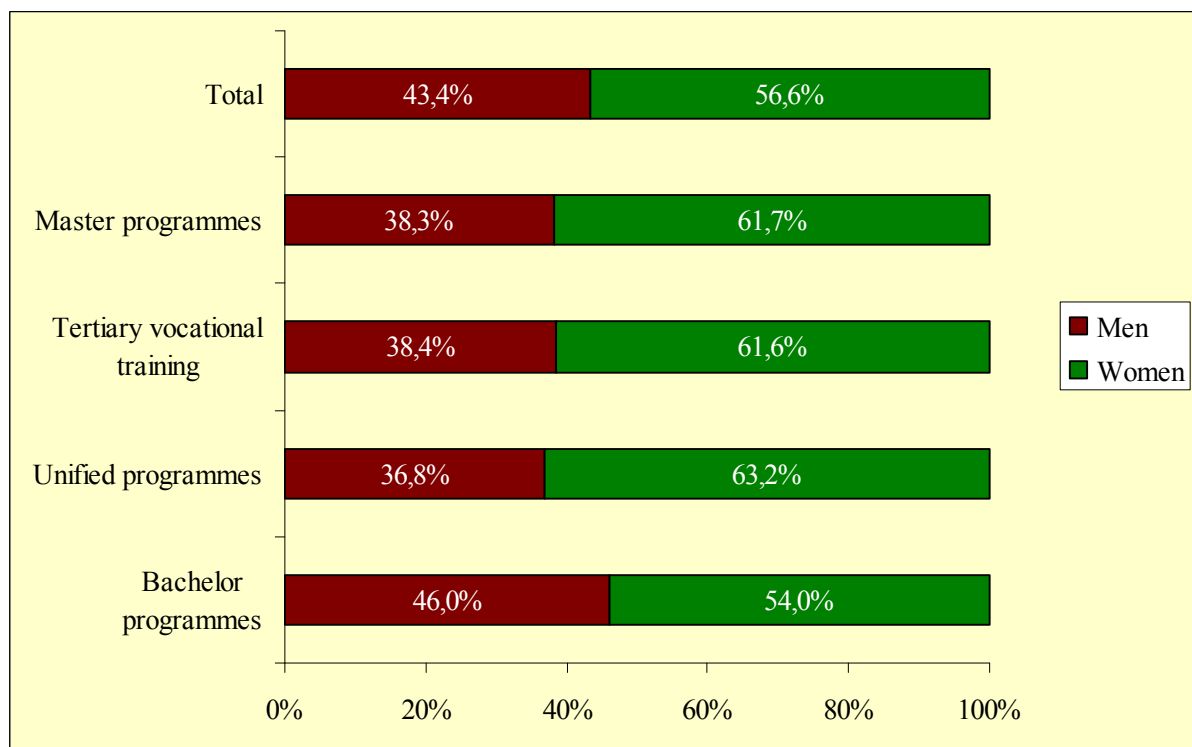


Source: Educational statistical yearbook, 2009/2010.

Summarizing the newest (2011) admission process data, we may conclude that the number of women who applied was greater by 10% than men. The smallest difference, according to the previous data, was among applicants for undergraduate studies (8%), while more than 24% more women than men would like to switch to master courses in this term. We may conclude from these data and tendencies, that the number of women studying in higher education in Hungary, starting from the middle of the 80s, has flat-lined.

Recent experience suggests that the headcount for women wishing to take part in master courses has substantially exceeded that for men. (Figure 2.) There is a significant difference among the fields of various education forms: the most “masculine” subjects are considered to be I.T. and technical education, the number of applicants to these departments this year has exceeded by 80-90% the applications to national defence and military departments. Most women applied to pedagogical (81.1%), medical and health departments (78.8%), to humanities (74%) and to social sciences (69.9%).¹²

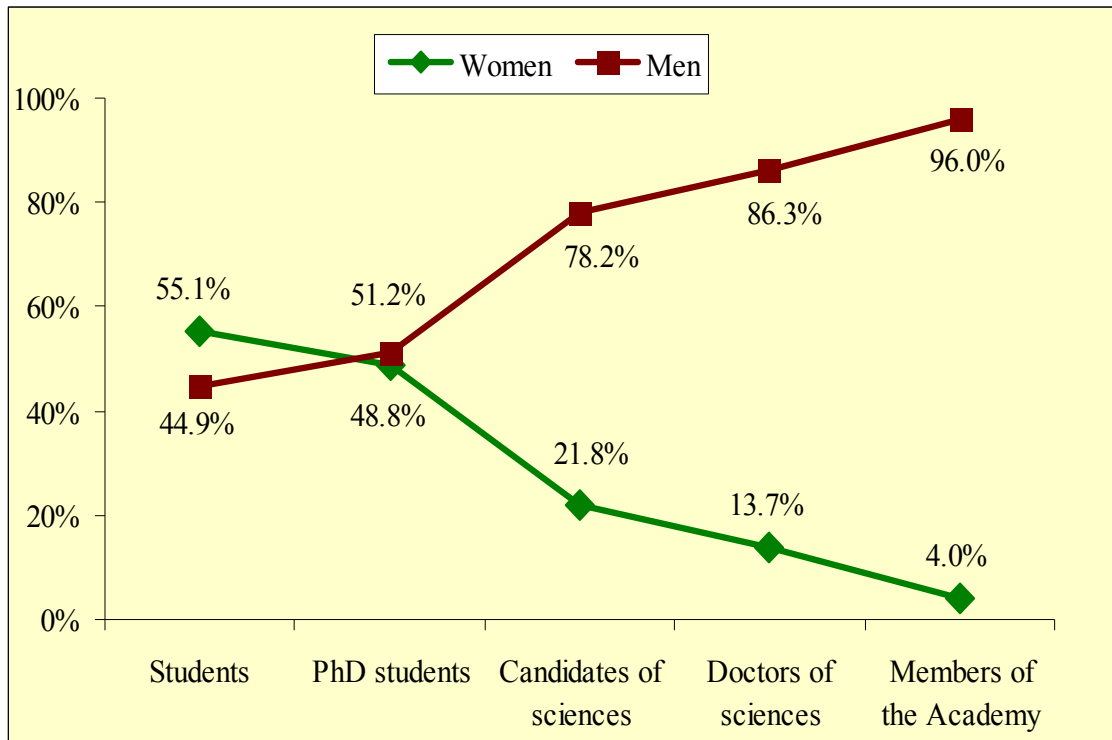
Figure 2. Distribution of applications by gender and type of education (Undergraduate applications in 2011)



Source: www.felvi.hu

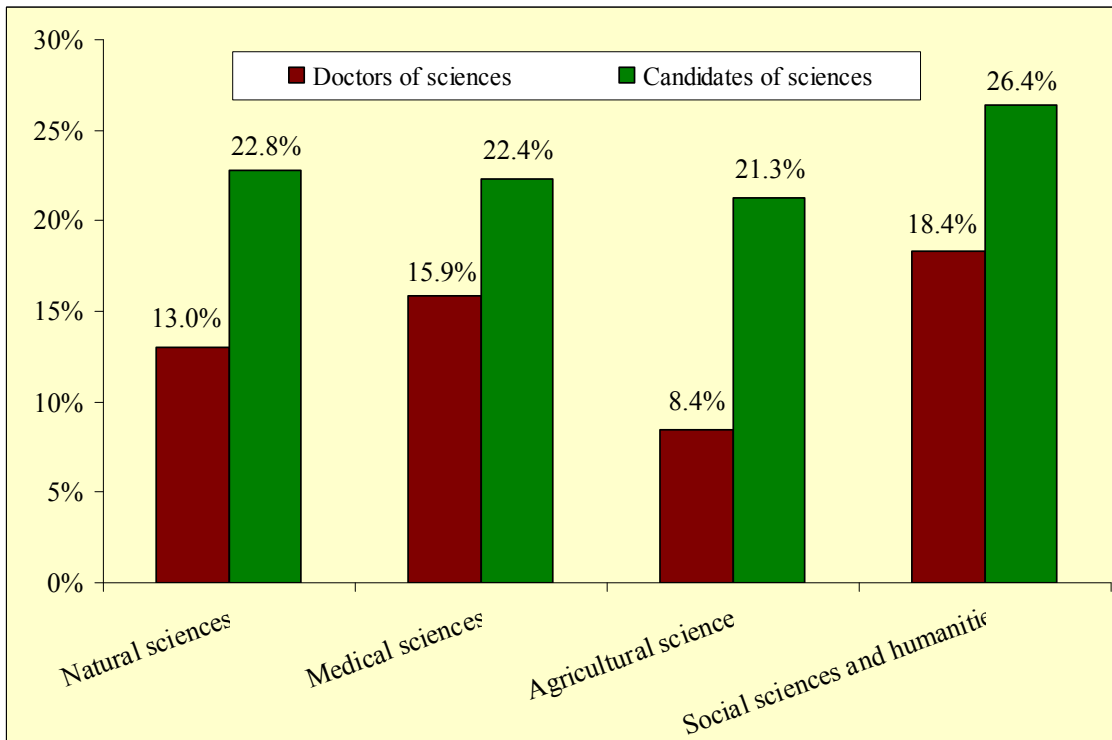
The differences between the two genders are more eye-catching in the case of scientific degrees. According to the 2009-2010 statistical data, more than 80% of candidates of sciences are men. At the same time, women’s proportion among doctors of sciences is even worse – only 17.3%. At the time of writing this essay, in May 2011, the number of women among the members of the Hungarian Academy of Sciences was only 4%. (Figure 3).

Figure 3. The proportion of women among students, PhD students and persons with a scientific degree



Sources: Statistical Yearbook of Education, 2009/2010. (students, PhD students); Secretary of the Doctoral Council of the Hungarian Academy of Sciences (scientific degrees, 2009); Webpage of the Hungarian Academy of Sciences (www.mta.hu) (academics, 2011)

Figure 4. The proportion of women by scientific degree and scientific fields



Source: Secretary of the Doctoral Council of the Hungarian Academy of Sciences

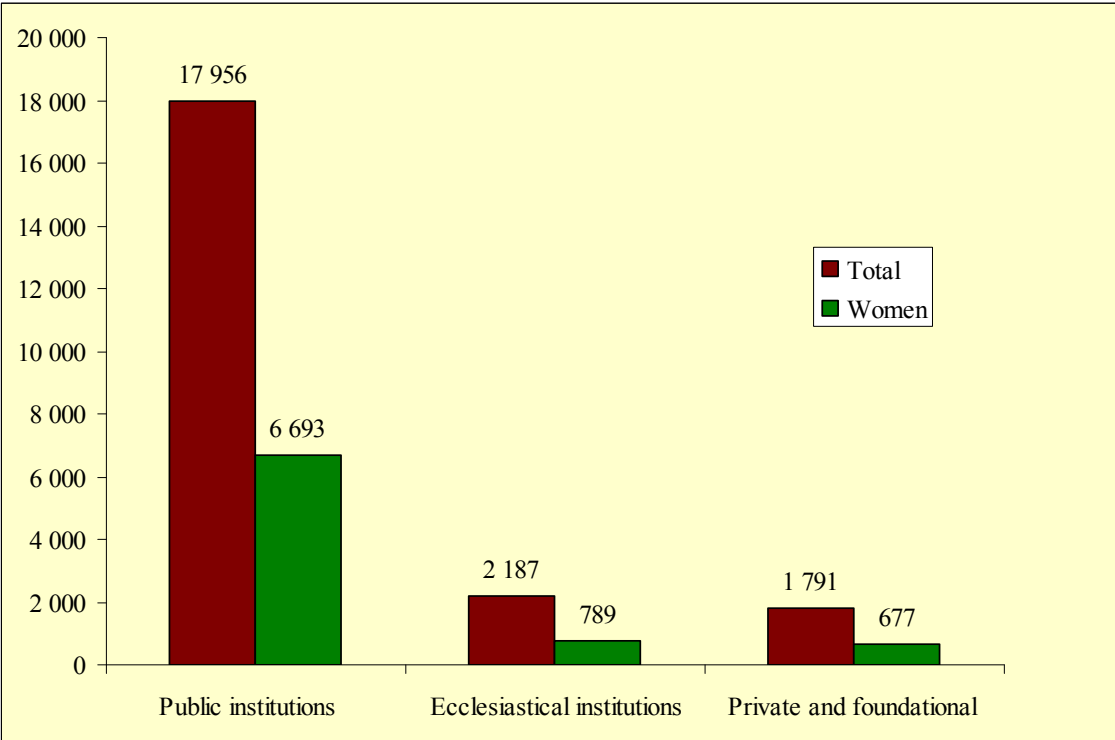
Considering women’s proportion, most female candidates are in the fields of social sciences and the humanities and the figures show the lowest levels regarding agricultural sciences. It is worth mentioning that the variances are not considerable; they are between 21.3%-26.4%. However, there is a much higher variance among the doctors of sciences in the field of social sciences and humanities, where the rate of female participation is only 18.4%, whereas among agricultural professionals it is only 8.4 %. (Figure 4.)

From the above we may see that the number of female students has significantly grown in the recent past, while in doctoral education we can still notice the dominance of men. In the following we will examine the rate of female employment among educators and researchers in higher education, and afterwards, in research and development positions.

3.3. Women in higher education

In the 2009/2010 term approximately 22 thousand persons worked as teachers at universities and colleges. In the different institutions maintained by the government (82%), the church (10%) and foundations (8%) the percentage of female teachers is 37.2%. Some types of institution did not show any difference between the levels of position among the women working in various positions. (Figure 5.)¹³

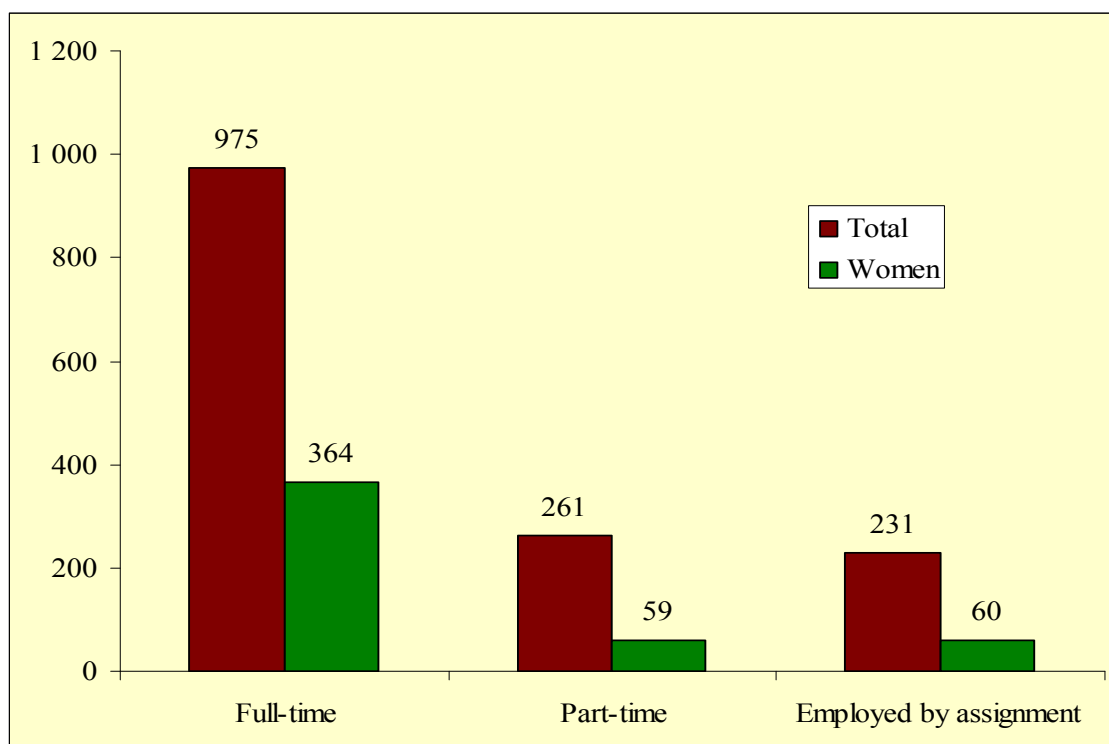
Figure 5. Number of teachers working in higher education



Source: Higher education statistics, 2009. Ministry of National Resources

Almost 1500 persons were employed in higher education in research jobs in the 2009/2010 term, among them 96% were working in state owned institutions, and 3.5% in the private sphere. One third (32.9%) of researchers in this period were women. While almost 67% of all researchers were full-time employed, the proportion of full-time female employees was even higher, more than 75%. This all means also that there were fewer female researchers employed on a part-time basis in the above mentioned period. (Figure 6.)

Figure 6. Number of researchers employed in higher education

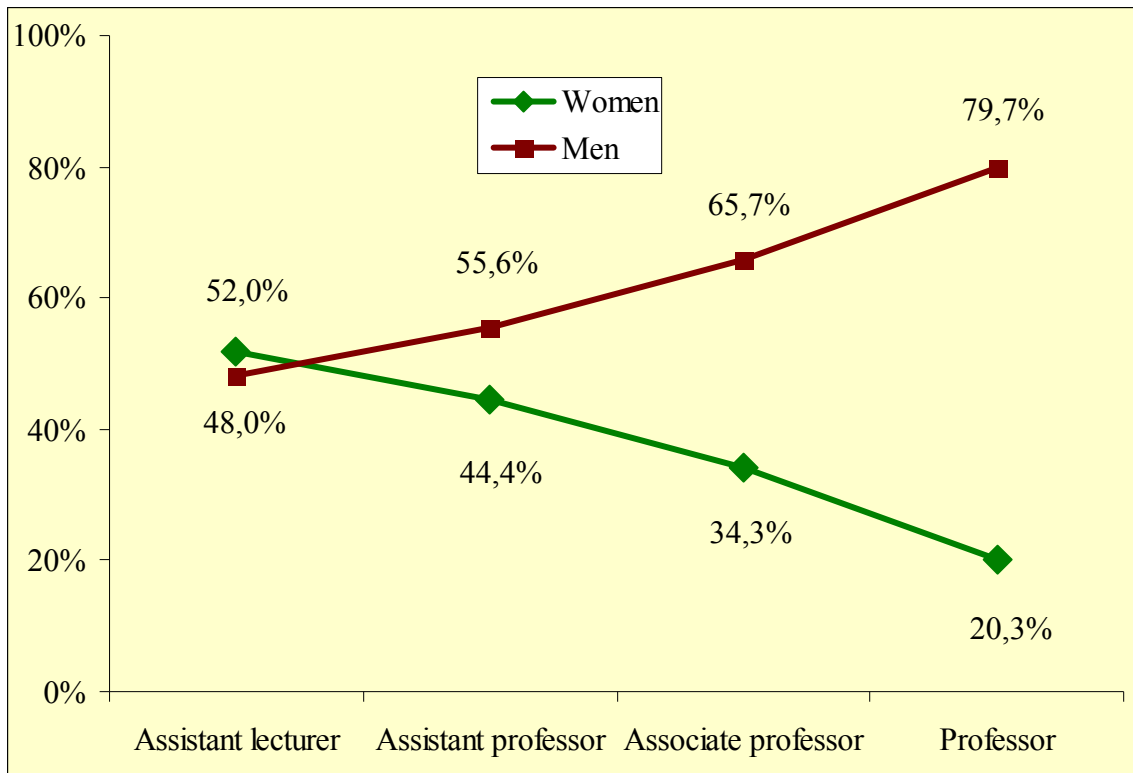


Source: *Higher education statistics, 2009. Ministry of National Resources*

The “scissor diagram” (Figure 7.) shows the differences between women and men in the university hierarchy. As we have already mentioned, the higher female participation rate in higher education is not characteristic for PhD students, and as we proceed along the “rating level” in higher education, the difference grows in favor of men. From all this we may conclude that a lot of highly talented women take part in higher education (e.g. look at their percentage in master courses), whose scientific career does not progress in higher education institutions.

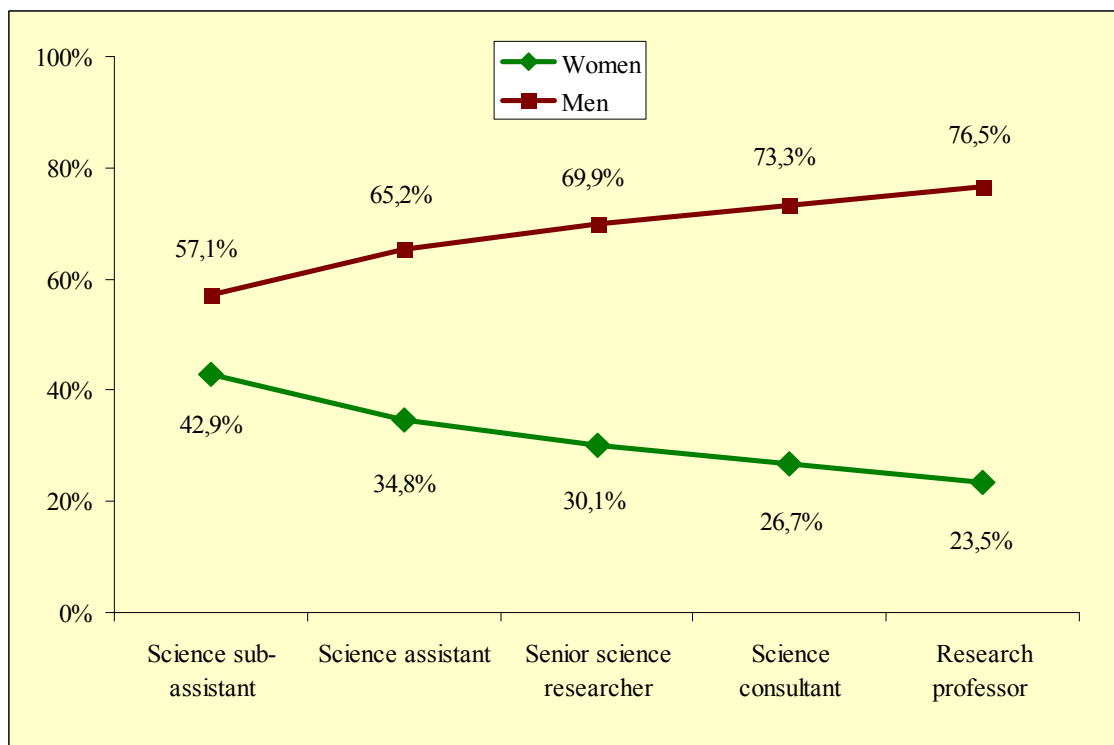
A similar picture may be gleaned if we try to examine the differences between genders for those working in research jobs. For the 2009/2010 term the ratio of women working in higher education was one third. In the “lowest” research areas their proportion was almost 43%, while out of the 4 research professor’s jobs, 3 were occupied by men. (Figure 8.)

Figure 7. Distribution of women and men in the university hierarchy



Source: Higher education statistics, 2009. Ministry of National Resources

Figure 8. Distribution by gender in research jobs at higher education institutions



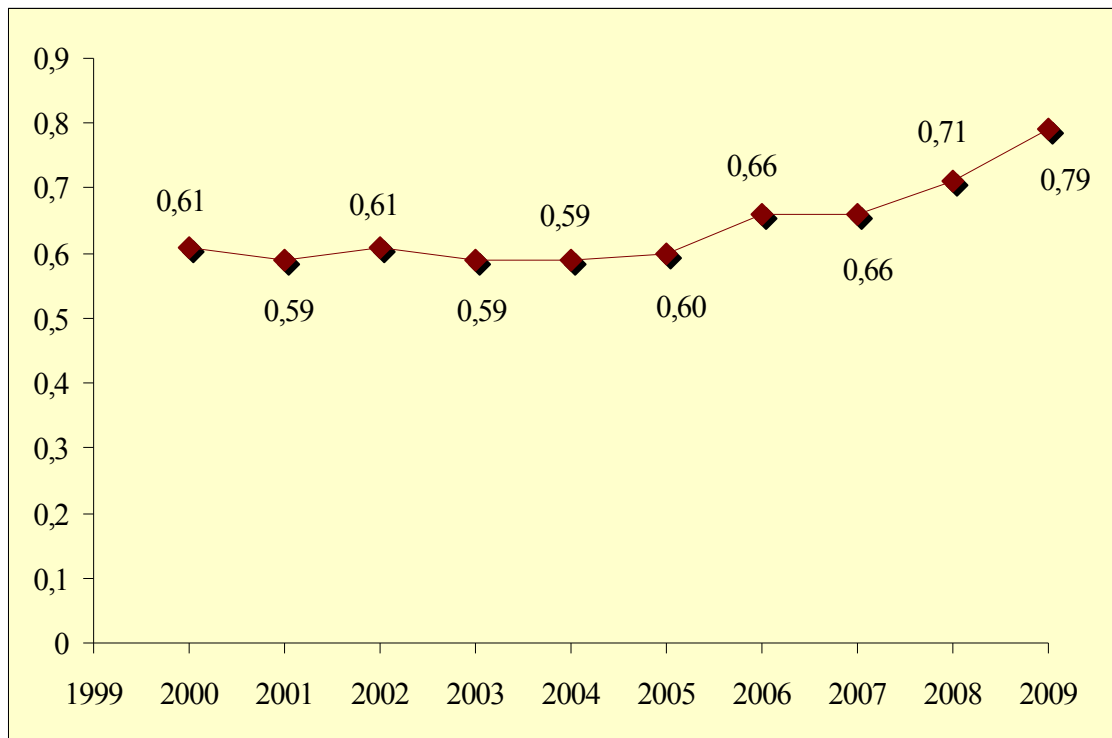
Source: Higher education statistics, 2009. Ministry of National Resources

3.4. Women in research

In Hungary in 2009, at the 2900 research institutions, more than 52500 persons worked in research and development. The work of more than 35 thousand persons was helped by 8700 assistants. The number of workers considered full time (FTE) was 29.800 (about 20 thousand researchers and 5.500 assistants).

The headcount of R&D jobs (FTE) starting from 2000 for all employees is shown in Figure 9. According to this graph, it may be stated that the proportion of those working in research and development compared to other employees has significantly gone up in the past two years. But it should be noted that the rise is only partly due to the jump in R&D numbers, decrease in employment also plays an important role in this.¹⁴

Figure 9. Total R&D personnel as a percentage of active earners



Sources: Research and development, 2009. Central Statistical Office, Budapest

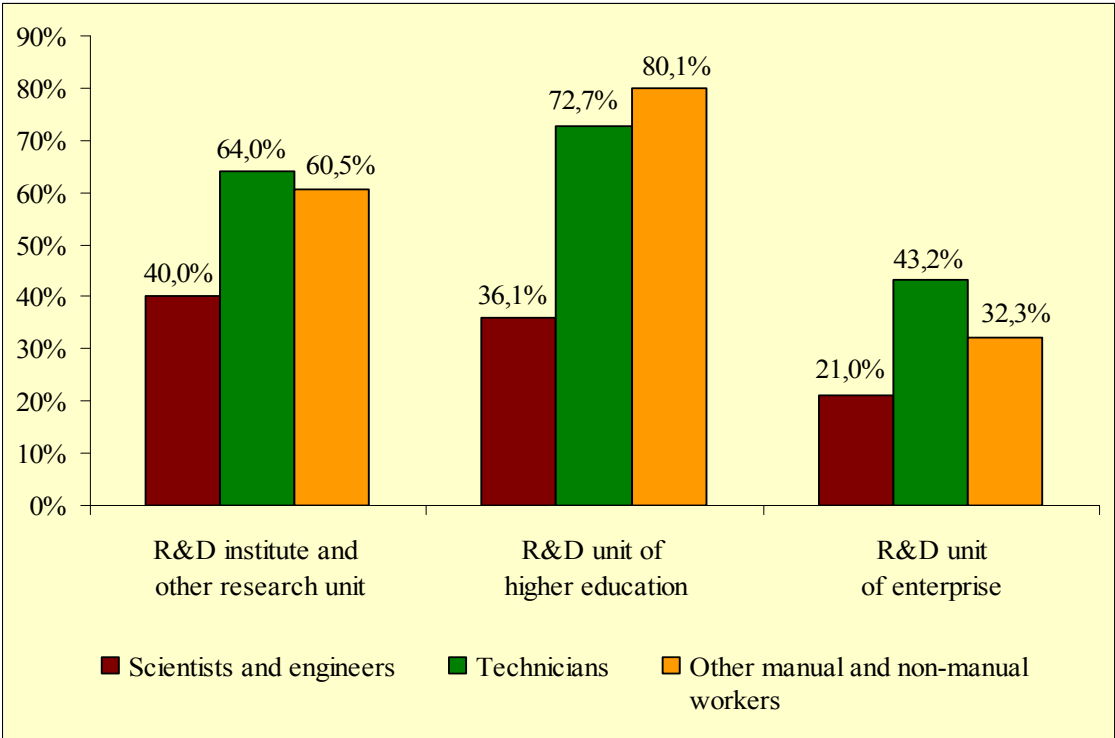
In 2009, 42% of R&D personnel were women, but their distribution was different by occupation. While two thirds of scientists and engineers were men, 59% of scientific assistants and 64% of manual and non manual employees were women

We may also notice significant deviations among women working in R&D according to position and sector. (Figure 10.). In general it may be stated that most women were working at higher education R&D institutions, but in the case of businesses this proportion is less characteristic. In almost all positions in science research and development, the level of women is the lowest. In the period studied, only every fifth researcher in business was a woman. But in the case of assistant researchers and other manual workers in research - especially in R&D that was not business related, most of the employees were women.

It is worth examining, in the case of female workers, the range of difference between separate sectors of research and other positions. In the case of research institutions this difference is

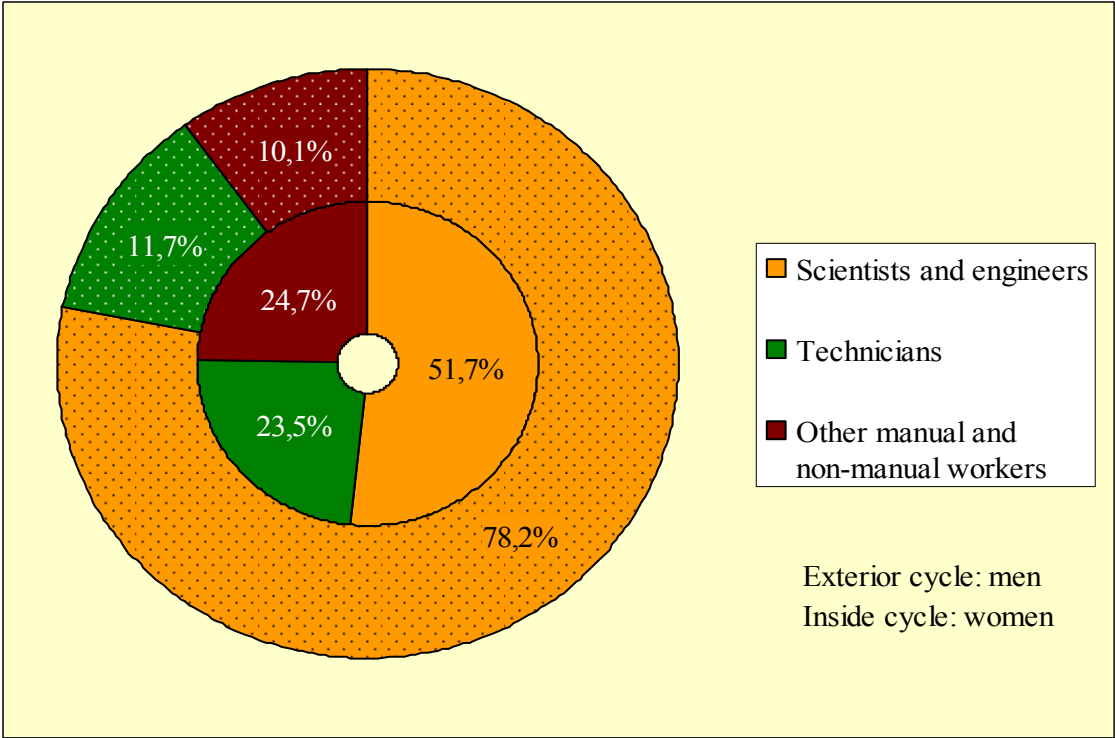
20%, in higher education it is 40%, and in the business sector it is only 11%, which means the gap between those working at the universities and HE institutions is surprisingly high.

Figure 10. Proportion of women at R&D units by sector and occupation in 2009



Source: Research and Development, 2009. Central Statistical Office (KSH)

Figure 11. Total staff number of R&D units by gender and occupation



Source: Research and Development, 2009. Central Statistical Office, Budapest

Figure 11. shows the substantial difference between men and women with respect to the types of occupation. 80% of men working in most of the R&D units in Hungary perform R&D tasks. In the case of women this level hardly exceeds 50%, and the others work as assistants and manual workers at the R&D institutes.

The proportion of women working in R&D is also different with respect to the various science areas. (Table 2.) It is not surprising that the proportion of female researchers is the highest in the field of humanities, and a proportion of more than 40% in the area of social science was also to be expected. But it is worth highlighting that medical sciences are in second place. If we examine this problem with respect to age, we may notice that among young female medical researchers, this proportion is almost equal to that of men, and in the 25-34 age group it even exceeds them.

Overall we may conclude that the female proportion among elder women is lower, and in the case of 65 year olds it does not exceed 20%. However, the average lifespan of women in Hungary is also substantially higher than that of men, and there are many factors that are involved: women usually retire at an earlier age; 30-40 years ago, today's older generation of women were more restricted in studying in higher education, etc. It is worth paying special attention to the 25-35 age group because, at 31%, they may be considered the most populous category.

While analyzing the data in the table, we may infer that women seldom choose technical and natural sciences as their area of education. Only one out of every five researchers is a woman, and in the case of the younger age groups it is the same situation, so we cannot expect to see more female researchers in science fields in the future. Besides the above, it is also worth mentioning another phenomenon. In the case of scientific degrees, we mentioned earlier that the percentage of women is lowest in the agricultural sciences. According to the data mentioned in Table 2. the proportion of women under 25, compared to the whole research sample, is the highest, and even among the 25-34 age group, more female researchers work in agriculture than men. Bearing this in mind, we may assume that in the future the percentage female researchers with scientific degrees will change for the better in the agrarian area.

Table 2. Percentage of female researchers by field of science and age in 2009

Field of science	< 25 year	25-34	35-44	45-54	54-64	>65 year	Total
Natural sciences	30,1%	24,5%	19,9%	22,0	21,6	11,0%	22,3%
Engineering & technology	21,6%	21,6%	21,3%	27,1	20,2	9,7%	21,7%
Medical sciences	50,0%	51,2%	44,4%	46,1	39,3	27,2%	45,0%
Agricultural sciences	62,3%	51,0%	37,4%	33,1	28,2	12,5%	38,4%
Social sciences	59,5%	47,7%	45,3%	43,9	35,4	20,7%	42,2%
Humanities	55,6%	53,1%	45,9%	47,1	44,9	22,5%	45,8%
Total	32,0%	33,1%	32,5%	35,5	30,1	16,9%	32,1%

Source: Research and Development, 2009. Central Statistical Office, Budapest

In the following two graphs (12. and 13.) there is a comparison between the distribution of female and male researchers according to age and science areas. We may conclude that on the whole, the differences among the science areas in relation to women are smaller than in the

case of the other gender. In the case of women, excepting the agrarian sciences, the proportion is about 20%, whereas in the case of men in technical and natural sciences it is 30%, and in other cases, with the exception of agriculture, it is around 10%.

Figure 12. Distribution of female researchers by field of science and age in 2009

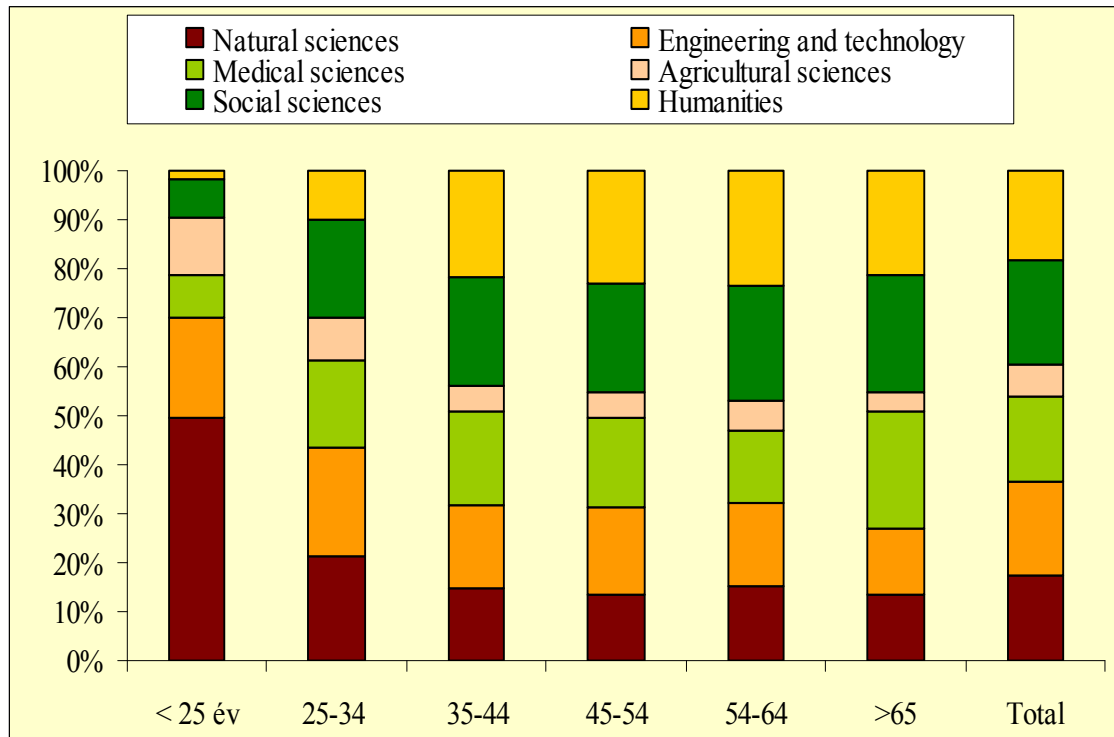
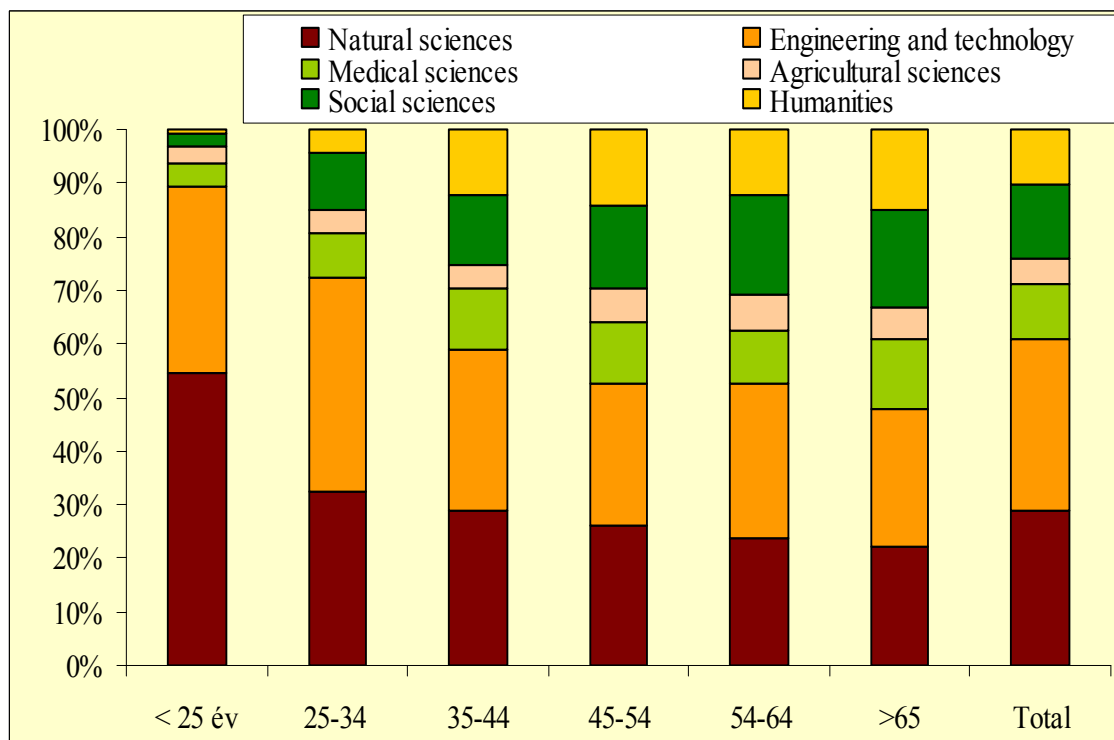


Figure 13. Distribution of male researchers by field of science and age in 2009



Source: Research and Development, 2009. Central Statistical Office, Budapest

3.5. Differences among genders in salaries

According to data from the Central Statistical Office, as we have already stated, the average gross salary of men exceeds that of women by 17%. Analysis made by a Hungarian recruitment website, taking into consideration the salaries of 80.000 workers, and published in March 2011, shows that women earn 25% less than men.¹⁵ According to the research, the average salary of men in the present job market in Hungary is USD 1350, while that of women is USD 1010.

Regarding education, the greatest difference, 31%, is among degree holders: women earn approximately USD 1430, while the men get USD 2060. Comparing the positions, it is evident that as we proceed to the highest positions the scissor opens up: in the case of assistant employees, the average difference is 7%, in the case of professionally skilled workers the difference is 23%, and among the top managers women earn 29% less than men.

Following analysis of the professional skills, the survey suggests that the women at the beginning of their career experience less bias, as they earn only 16% less than men. The average gross salary of women at the beginning of their career is USD 890, compared to the USD 1070 of men. In the case of two-three years of work experience, men earn 26% more than women, and in the case of six-ten years of work experience, the difference is 31% more in favor of men.

3.6. Legal conventions in Hungary that improve the position of women undertaking a job, in providing equal opportunities, and in helping them to combine their family life and professional career

In compliance with the Constitution of the Republic of Hungary (Act XX. of 1949, Article 70/A.):

(1) The Republic of Hungary shall respect the human rights and civil rights of all persons in the country without discrimination on the basis of race, color, gender, language, religion, political or other opinion, national or social origins, financial situation, birth or on any other grounds whatsoever.

(2) The law shall provide for strict punishment of discrimination on the basis of Paragraph (1).

(3) The Republic of Hungary shall endeavor to implement equal rights for everyone through measures that create fair opportunities for all.

Act CXXV of 2003 on equal treatment and promotion of equal opportunities defined various types of discrimination, including discrimination based on gender, and includes a provision on its prohibition. With this act the Republic of Hungary harmonized the directives of the European Union concerning equal opportunities for women and men.

An act constituting direct bias is one by which a person or a group is adversely treated compared to others. We speak about an act of indirect bias when individual persons or groups are being appointed to higher positions than others. The enforcement of equal opportunities is the responsibility of a civil institution (Equal Opportunities Authority).¹⁶

Since January 2011 a number of acts improving women's position in Hungary have been established. Some examples follow.

- The employer shall pay only 20% instead of 27% social security tax for a woman working part time. This Act provides help to those women who, due to child rearing, cannot work full time but may be able to work part time.

- Child benefit is provided by the state until a child reaches its third year to those parents or preceptors (educators) or person in charge, who bring up the child in their own household. In the case of twins, benefit is provided until the end of school age, in the case of seriously ill or handicapped children, child benefit is provided up to the child reaching its 10th year. The parent or educator of the child, who receives child benefit, may apply for a job which does not exceed 30 hours a week when their child is one year old. There is no time restriction if the parent carries out this work at home; the same applies to parents or educators raising seriously ill, handicapped children or twins. The grandmother or grandfather of the child who is on maternity leave may continue working after the child is three years old.
- An additional child benefit is due to a parent, educator or person in charge who is raising three children in their household. This grant is due from the youngest child reaching their third year, until the same child reaches the age of 8. The parent who receives this child benefit may work not more than 30 hours per week, or without restrictions if the work is carried out at home.
- It is compulsory to deduct pension contributions from the gross amount of these child benefits, as a result of which it is calculated as a working tenure.
- A woman may get a pension irrespective of her age if she has had a working tenure of at least 40 years. Working tenure is considered to include: a working period with social security payments, pregnancy and maternity leave, the child rearing period, and any authorised period raising a seriously ill or handicapped child.
- A tax relief for families has been recently introduced. One may deduct from the contracted basic tax payment USD 330 in the case of one-two dependants and USD 1090/person if they have three dependants.

4. Conclusions, policy implications and directions for further research

In this presentation we have tried to show, on the basis of the most up-to-date data existing in Hungary, which compared to other countries, women are overrepresented in higher education, and that this phenomenon does not translate into equal or higher salaries in the labor market, comparable scientific careers, promotion, becoming a manager in their field, etc.

Several domestic and international research projects have aimed to find the reasons for this. As a result of these findings, and in accordance with our own analysis, we may conclude that the reasons can be found in education. While men are mostly interested in I.T. and technical subjects in education, women are still leaning towards pedagogy, medical and health sciences, philology and social studies. This tendency is characteristic of the labor market as well. We may notice more women working in the sphere of health, social services, in education and nursery. It is not striking that we find more men working as I.T technicians, engineers, and in banking and finance, where the salaries are much higher.

In examining the careers of degree holders just starting a job, it may be pointed out that the highest initial salary is in the field of IT; on average it may reach USD 1920. In other industrial fields in the first working year it may be on average USD 1760, in pharmacology USD 1750, in banking and finance, USD 1590. In the fields that are traditionally chosen by women, such as culture, sport, and wellness the salary of beginner is USD 1170, in media USD 1130, in advertising, marketing, and PR it is USD 1110, in health USD 1070, and in educational institutions, only USD 860.¹⁷

It is also worth mentioning the fact that the job scissor between the two genders is ever increasing, with respect to the difference in their education, number of years spent in labor and age. It is also evident that even if a woman is able to obtain a manager's position, it is accompanied by a lower salary, allocations, fringe benefits (car, travel), and worthwhile opportunities etc.

The difference between the two genders continues to widen concerning PhD students, according to our study, most of whom are men, and as usual there is a preponderance of science fields and degrees that traditionally stick to differences between "men" and "women". (Figure 4)

The professional career of women is also hampered by other, supposed or real, obstacles. In the past 10-15 years it has become more difficult to get a job in Hungary. Usually there are many applicants for one job. In this case employers, according to evidence, take into consideration several factors, among them being resilience, the ability to work overtime, flexibility and mobility, the ability to be available all the time, and long term plans. In the case of single women, employers usually take into consideration the likelihood of them getting pregnant, after which a woman remains at home for at least several months or even years.

Women who raise small children are considered unreliable employees, as they usually stay at home if the child is ill. Like several European Union countries, in Hungary daytime child care is quite expensive, so it is no coincidence that the employment rate of women with children is considerably lower, not only than that of men, but of childless women too. (The difference in the EU is on average 13%). The causes are evident: as housework and raising children are mainly considered to be women's tasks, employers give them less attention.

Besides, some other stereotypes also contribute to the differences in employment, salaries, and careers of women. Traditionally it is considered that women are weaker, have lower resilience, their decisions are based on an emotional basis, etc. Unfortunately, women themselves sometimes inhibit their female counterparts' promotion chances in professional careers. (Queen Bee syndrome)¹⁸ Overall, we may conclude that women have to fulfil a lot more expectations in order to get similar recognition to men, and they have to make far more sacrifices in order to achieve what men do.

The position of women who work in the area of science is also different from the traditional. Working in the science field demands a specific lifestyle. The expectation is to have continuous professional success, personal achievement, visibility and perfection, a step up the hierarchy.

*"Those positive changes that happened in the life of women in their intelligence and education, mean alteration mainly cognitively, while the differences due to the traditional consistency expectations are still real in the lives of science researchers. The disadvantages for female researchers can be mainly traced back to the stereotypes between men and women and the division of the functions of men and women. The hierarchy was created by the job development tendencies of the founders, which are developed by the closed-shop nature of the men's world among scientific researchers as well. It is much more difficult for women to meet the demands of the science world mainly because the burdens of combining private and family life with careers entail a much bigger load than that for men. But even in equal situations women are at a disadvantage, because of such personal considerations as the stereotype of men being her superior (Senior Manager), in providing opportunities, or rather the advanced confidence of men means further advantages for them. And fewer opportunities mean less professional success, fewer publications and lagging behind in the science hierarchy for women"*¹⁹

To summarize the above, we may say that a radical change in the work of women, especially those working in science, is not to be expected in the near future. Naturally several measures may bring about improvement, such as legal changes, administrative instructions, grants, tenders, awards, institutions helping with children and services, etc.

But aside from measures, it is far more difficult and time consuming to solve the bias (prejudices) and stereotypes that exist among women and men. By preparing this essay, the authors wish to contribute to a change of mentality in this respect, and in the future we wish to compile a survey of educators, researchers and students at Semmelweis University to investigate the position of women, their attitude, opportunities and expectations.

Budapest, June 2011.

5. References

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¹⁸ The queen bee syndrome refers to the phenomenon, described by a number of the researchers, that some women who get into higher positions – despite the preliminary expectations – do not help the promotion of their counterparts, but rather block it. [Pl. Ellemers, N.; van den Heuvel, H. (2004). "The underrepresentation of women in science: differential commitment or the queen bee syndrome?". *British Journal of Social Psychology* 43 (September): 313–338]

¹⁹ Mária Schadt: Unequality of chances in the scientific area. Changes of roles. Survey about the situation of women and men. 2011. Ed.: Nagy Ildikó, Pongrácz Tiborné, TÁRKI, Budapest, 2011.