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Women in Science – Why Networking Matters

JULIA STAMM (with research input by VALENTINA GAROIA)

COST Office, Avenue Louise 149, 1050 Brussels, Belgium. E-mail: jstamm@cost.esf.org

Although the representation of women in science and research has improved significantly over the past few years, women are still far from enjoying the same presence and visibility as their male colleagues. This article depicts the current situation by providing recent data, and it explains why more efforts are still needed. It introduces key concepts that are important for a better understanding of the situation of women in science. Some special attention is given to the particular state of affairs of female scientists in the former communist countries. Finally, the article introduces networking activities as a key tool for strengthening women's position in the world of science and research. It presents the main findings of a recent study on women's engagement in international research networks, which proved to have tangible positive career implications for the researchers involved. Thus, the article calls for further efforts to encourage female scientists, both senior and junior, to actively engage in research networking activities in order to shape their profiles, strengthen their position and contribute their expertise to international research.

Introduction

> To promote women in science requires changing our own vision of science. It is about real commitment and imagination. (Ref. 1, p. 15)

The underrepresentation of women in the world of science and research is a well-known and often discussed phenomenon. Although their situation has improved over the past few years, women are still far from enjoying the same visibility as their male colleagues. Of course, the picture takes different forms depending on the country and research fields one looks at.

If, today, there is an awareness of women and science as a problematic and political issue, this is due, to a large extent, to efforts undertaken at a European

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Union level. In 1999, the European Commission initialised an action plan to 'mobilise women scientists to enrich European research'.[2] As a consequence, the Helsinki Group on Women and Science was established, comprising senior civil servants and/or gender experts from 32 countries. In 2003, the Helsinki Group and its sub-group of statistical correspondents published *She Figures 2003*, providing – for the first time – consolidated data on the participation of women as graduates, researchers, academic staff, funding beneficiaries and scientific board members. The collection and interpretation of the national data testified, at a European level, of the pressing need for women to contribute more strongly to science and technology. In 2006, the second issue of *She Figures* was published, continuing the previous work and enabling an analysis of the evolution of female participation in European science and research. The results were rather deflating: women remain underrepresented in science, particularly so in leading positions. In the report, Janez Potočnik, EU Commissioner for Science and Research, rightly points out that Europe cannot afford a situation like this:

> Women's increasing participation in the European Research Area is integral to its success. There can be no room for gender bias if the EU is to move towards the 3% objective and achieve the knowledge-based economy that is so essential for the sustained competitiveness of Europe. (Ref. 3, p. 5)

She Figures 2009 was due be published in Autumn 2009. When this article went to press, a first selection of preliminary results was already available.[4]

Some figures to set the scene

The data gathered in *She Figures 2006* prove that – despite a slight increase in the number of women in research (from 27% in 1999 to 29% in 2006) – patterns of horizontal and vertical segregation by sex are still strongly present. The overall situation regarding gender mix in the training and careers hierarchy can be described as a simplified scissors diagramme. In 2003, women comprised more than 50% of the total university population. Fifty-nine percent of European female students from the EU-25 completed their basic courses, compared with 41% of male students. The scissors effect becomes effective once students reach levels that pave the way to academic and research careers, such as the doctoral preparation stage. The figures for PhD/Doctorate or equivalent graduates stood at 43% in 2003 (which is an improvement when compared with 38% in 1999). The former Communist countries, with their strong traditions of scientific gender mix, denote the highest proportion of women reaching PhD level.

It has to be pointed out, however, that these figures include all disciplines and thus veil significant gender variations across sub-fields. Within the EU as a whole, women are more likely than men to choose education, humanities and the arts, health, welfare, agriculture and veterinary studies. In social sciences, law

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and business, women and men are almost equally represented. The 'hard' sciences, mathematics, computing and engineering have a more pronounced differentiation of choice, being far more popular with men than women.

As *Research EU* (Ref. 5, p. 8) points out, 'decreasing numbers of women illustrate the "leaks" that occur as one moves further up the academic hierarchy'. According to *She Figures 2006*, at the highest level (grade A) in universities and research institutions, women have just one representative against six male colleagues (15% versus 85%). Women were best represented in Romania (29%) and Latvia (26.5%) and were least present in Germany, the Netherlands, Austria and Belgium (around 9%). Along the same lines, *She Figures 2003* reveals that, in the EU as a whole, women at grade A constitute only 6% of the academic staff, in contrast with men at that grade who constitute 18%, and there are many countries where the discrepancy is even bigger than this. The authors conclude that 'this pattern of presence (or absence) creates the impression of a male-norm for seniority' and suggest 'the fact of male-dominated decision-making and leadership, either or both of which may effect women's progress through the hierarchy' (Ref. 1, p. 52).

In 2008, the Helsinki Group published a further comparative study, *Benchmarking Policy Measures for Gender Equality in Science*,[6] which confirmed that there is a huge variety of situations with regard to women in science in the different EU member states. The report reveals that the former communist countries employ the major proportion of women in scientific structures (between 30% and 50% of jobs in the R&D sector compared with 20–35% in the EU-15). It has to be noted, however, that in terms of research budgets, the situation is reversed: very often, the larger share of women in the new Member States receives a greater proportion of the very limited resources.

Leaky pipelines, glass ceilings and two-body problems

The literature on women in science increasingly studies the nature and effects of the social context on women's relation to science. Throughout their development, men and women are immersed in a network of opinions and social beliefs that influence and shape their evolution and future and become decisive in the construction of a professional scientific career. Three major concepts emerge in the relevant literature. The *leaky pipeline* syndrome is used to refer to the steady attrition of women that takes place at each stage of the careers of women in science, from primary education to decision making in science and technology. Five major barriers, or 'leaks', have been identified: socio-cultural attitudes; education; academic appointments; science and technology professions; S&T development and transfer. In this context, it emerges for instance that female students are more quickly destabilised by difficulties and that the importance of a mentor is greater for them than for men (Ref. 4, p. 41).

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The second concept is the metaphor of the *glass ceiling* index, which is used to describe the apparently invisible barriers that prevent many women from reaching the top levels of management. 'Compared to formal barriers to career advancement such as education, the glass ceiling refers to less intangible hindrances – frequently anchored in culture, society and psychological factors – that impede women's advancement to upper management or other senior positions' (Ref. 7, p. 4). A score of less than 1 indicates that women are over-represented while a score of more than 1 hints at an underrepresentation. Thus, the higher the index, the thicker the glass ceiling and the more difficult it is for women to move into higher positions. As the preliminary results of *She Figures 2009* reveal, at EU-27 level, the index stood at an average of 1.7% in 2007. This indicates that a glass ceiling effect can be observed in all countries, although its extent differs considerably between them. At one end of the scale are Cyprus (3.7%), Lithuania (3.0%) and Luxembourg (2.8%), while at the other end we find Romania (1.3%), Turkey (1.2%) and Ireland (1.1%).

Another threat to women's professional development stems from the *two-body problem*, which threatens scientist couples where both partners wish to pursue their careers. As several studies have revealed, a couple generally plants it geographical roots depending on the man's career. Careers are further unbalanced when children are born.

A further male advantage that is particularly interesting in the context of this article used to be the ability to insert oneself into networks. High-ranking scientists (who very often are male) play the role of 'social capital bankers'. They serve as mentors for promising young scientists (again very often male) and introduce them to their networks. Building links to peers through networks is crucial for solidifying one's career. Professional networks have always been important, and their importance is still increasing. For scientists, being involved in research networks appears to be fundamental; it is crucial for them to be informed of what is going on in their research fields in other universities and countries and to interact with their colleagues. Several studies revealed that, in the past, men were more able to integrate and benefit from networking activities. High-ranking scientists tend to put more trust in male young hopes and promote them rather than their female peers.

A few words on the situation in the former communist countries

Before turning to the heart of this article, a few lines have to be dedicated to the situation of female scientists in the former communist countries, since this differs, in some respects considerably, from that in the former EU-15. It is the Eastern European paradox that the majority of the countries that joined the EU in 2004 and 2007 have a higher proportion of women working in science and research than the EU average while, at the same time, they are also the countries with the highest glass

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ceiling index. Keeping this finding in mind, it is interesting to look at the history and evolution of female participation in science and research in these countries.

In 2002, the European Commission established a group of independent experts, known as the Enwise (Enlarge Women In Science to East) Expert Group, and asked them to report on the situation that women scientists are facing in the former communist countries. Unlike the rest of Europe, these countries underwent four dramatic macro social and political changes after 1945. These include the liberation from former empires, resulting in the creation of independent nation states, the communist takeover, the rebuilding of democratic political systems and the transition to market-oriented economies, and the process of accession to the European Union (Ref. 1, p. 18). The report acknowledges the legacy of the communist gender policy, underlining that the importance of education in these systems, and access to it, has led to the emergence of a considerable proportion of highly-qualified women, notably in science. However, it has to be noted that this formal gender equality was achieved and sustained through political censorship. In addition, the system perpetuated and deepened horizontal and vertical segregation in all areas of employment (including the higher education and research sectors).

Although today there are higher proportions of women among researchers in these countries than among the EU-15, important gender differences persist. Women constitute the majority of teaching staff (54%), but tend to be concentrated in the lower academic positions. They are still underrepresented at the top positions in academies of sciences and universities. Finally, men are three times more likely to reach senior academic positions than women.

Interestingly enough, the existing glass ceiling was not reflected on, named or criticised by women in the communist countries. Neither was it picked out as a central theme in the social sciences. Even more interesting is the expert group's observation that up to now gender awareness is still lacking in the majority of women themselves: it 'has turned out to become the major breaking factor to women's career advancement: in terms of career limits being accepted as a natural consequence of their dual role, and in terms of very low sensitivity to unequal treatment' (Ref. 1, p. 26).

Today, the Enwise report concludes, the prospects of young female scientists in the former communist countries are very bleak – due to the unavailability of funding, the rigid patterns of promotion and recognition, and the lack of appropriate welfare policies, all of which are potential causes of a 'brain drain' (Ref. 1, p. 7).

Women scientists and the importance of networking

The gender imbalance in science and research is still a problematic issue that cannot be ignored. The need for equality between men and women on this point has been highlighted by the Amsterdam Treaty and the Lisbon Agenda.

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However, the problem goes further than that. As Britta Thompsen, a Danish MEP, states in Research EU, 'Europe is going to have to recruit an additional 700,000 researchers over the coming years' (Ref. 5, p. 36). Thus, women's participation in science and research needs to be strengthened, for democratic but also for economic reasons. 'If we do not act to confront this global competition we will have human resources problems', Thomsen points out.[5]

This need has been acknowledged by the EU member countries. In order to link researchers across Europe, and thereby strengthen their knowledge-base, networks are of particular importance. As Henry Etzkowitz points out, success as a scientist results from a combination of 'personal capital' (individual qualities) and 'social capital' (networks).[8] People with strong networks are able to learn from others with different knowledge or experience, get more things done more effectively, and are able to use their network as they wish to move on in their careers. In the scientific world, the importance of networks has been recognised as a central issue. The coordinating effect of the various networks was crucial in bringing Central and Eastern European countries into the European Research Area. Research cooperation is one of the four divisions of the Seventh EU RTD Framework Programme (FP7), 2007–2013, thus attesting that it is increasingly seen as being at the centre of Community policies.

Together with EUREKA and the European Framework Programmes, COST (European Cooperation in Science and Technology) is one of the three pillars of joint European research initiatives. COST, which is supported by the EU RTD FP, is one of the longest-running European instruments supporting cooperation among scientists and researchers across Europe. An intergovernmental framework established in 1971, COST increases the mobility of researchers across Europe and fosters the establishment of scientific excellence in nine key Domains:

- Biomedicine and Molecular Biosciences (BMBS),
- Chemistry and Molecular Sciences and Technologies (CMST),
- Earth System Science and Environmental Management (ESSEM),
- Food and Agriculture (FA),
- Forests, their Products and Services (FPS),
- Individuals, Societies, Cultures and Health (ISCH),
- Information and Communication Technologies (ICT),
- Materials, Physics and Nanosciences (MPNS),
- Transport and Urban Development (TUD).

Currently, COST supports over 250 project-oriented networks (Actions), bringing together thousands of researchers from all over Europe and beyond. Within its networking activities, COST puts great emphasis on the promotion of early-stage researchers (PhD students and post-doctoral fellows) as well as gender balance. All Actions and their Management Committees are required to show

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awareness of these issues. If a new project wants to be funded, concrete plans for gender balance are a necessity.

In order to find out more about the involvement of female participants in its Actions, the COST Office undertook a study in spring and summer 2009. As a first step, questionnaires were sent out to the female scientists involved in the FPS, ISCH and MPNS Domains. The reactions were enthusiastic and the response rate overwhelming, hinting at a huge interest from female scientists in this topic. This article presents the outcome of this (first) evaluation of the questionnaires returned from female scientists involved in network activities in the ISCH Domain.

The presence of women in the Management Committees (MC) – the governing and decision-making bodies of COST research-networking projects (Actions) – pretty much reflects the general share of female scientists in the different areas of research, with women being most prominent in humanities and least prominent in the engineering sciences. Across all COST Domains, the proportion of men to women in the Actions' Management Committees is 72% (male) compared with 28% (female). As could be anticipated, the ISCH Domain, which gathers projects in the humanities and the social sciences, shows the best record, with 45% of its MC members being female.

Among the respondents from the ISCH Domain, including Management Committee members and members of the Actions' Working Groups, 28% are Early Stage Researchers (ESRs or PhD students and researchers in the early phases of their career) while 31% are professors. It is interesting to note that the majority of respondents that are under 35 years old come from Central and Eastern Europe (the most recent EU member states). Here, 31% of all respondents are younger than 35 years (compared with 13% in northern European, 14% in southern European and 21% in western European countries). This finding indicates that getting involved in international research networking is especially interesting for younger researchers from the new member states, who hope to establish links with other research communities that could help them to embrace an academic career within, or even outside, their home countries.

Benefits of the involvement of women in research networking activities

The vast majority of all respondents claim that the participation in COST research networking Actions was and is very beneficial for them. These benefits encompass four major interlinked dimensions:

- Stimulation of exchange, cooperation and new ideas;
- Stimulation of research;
- Stimulation of publications;
- Career advancement.

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The possibility of meeting and working with colleagues from many different countries is perceived as extremely valuable. The participation in research networks greatly enhances connections between individual researchers and has positive impacts on their own research. It helps to broaden one's perspective and paves the way to new opportunities, such as new research ideas, access to new data, or even new academic career perspectives. The networking opportunities provided by COST considerably increase the possibilities for collaborative studies and joint publications. 'The professional acquaintance with several of the COST members and participants has inspired me to explore the opportunity to undertake new joint research projects', says a Greek scientist. A Norwegian professor hopes that her engagement in research networking 'can contribute to expanding my personal academic network. My participation will also work to expand my knowledge in the particular field on which the Action is focused, and thus make a more competent researcher.' Junior researchers, in particular, value the excellent opportunities of meeting and cooperating with more senior and well-known scholars than they otherwise would never have met.

Very often, the participation in international research networks, such as COST Actions, is appreciated by the home institutions of the female scientists and helps them to improve their standing and reputation not only among their peers but also 'at home'. 'My participation in the COST Action has been received very positively in my department and my schools', says a Greek professor. Similarly, a Lithuanian professor explains that her university 'highly appreciates' her involvement in international projects. In the same spirit, early-stage researchers experienced that their active participation in international networking projects was instrumental when successfully applying for scholarships and research grants 'at home'. This phenomenon can be explained by the fact that international networking activities not only benefit the individual scientists, but also their institution: 'On an institutional level, the number of researchers (especially PhD students and early-stage researchers) involved in COST Actions at our institute increased. Thanks to this, our university is increasingly popular, and so is our country. It takes time and lots of efforts, but it is worth it', explains a Bulgarian professor.

Generally speaking, the participation in COST networking activities proves to be a good record on the CV of a researcher. Numerous respondents testified that their involvement in the COST Action and the contact with researchers from other countries increased their credit as researcher. A German senior researcher explains that she 'benefited from being Vice-Chair and from having written the proposal. I got to know many researchers active in my field. Involvement in successful proposals will be important for my future applications'. Here again, the networking activity is beneficial for both more experienced as well as more junior scientists. Thanks to her engagement in a COST Action, a Danish PhD

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candidate 'received a large national grant to do research related to COST. I have learnt many academic tools through my participation in the project, knowledge that is not available within the national academics'.

Their active participation in international research networking also has notable consequences for the female scientists' self-confidence and personal development. Several respondents claim that the international experience gained through the involvement in COST Actions helps them to develop skills needed in order to take on leading roles. In particular, female scientists in Central and Eastern Europe confirm this finding: 'I developed some additional necessary skills for my leading role as the head of the institute, and may organise similar research networking at home and abroad,' explains a Slovenian professor. A Lithuanian professor notes that, following her participation in a COST network, she became the 'leader of an interdisciplinary working group which coordinates the preparation of FP7 projects.'

Many women scientists declare that their involvement in these research networks and the experience thus gathered have encouraged them to apply for additional grants, very often larger research grants, together with international consortia of colleagues they met in the course of their international networking activities. In many cases, the female scientists even took the lead in these applications and later on in the approved projects. Very often, they admit, they would not have had the courage to do so without the experience gained through their engagement in the networks.

Being able to jointly publish with peers from other countries involved in the same networks is of huge interest for the female scientists, and they believe this to be one of the major benefits of the involvement in networking activities. They highly value this opportunity and clearly see its benefits, not least in terms of fostering their academic career. 'With my COST colleagues, I have had several publications, which means that I am now up for promotion to full professor,' notes a Dutch researcher. A Spanish colleague who just recently became involved in the network assumes that, although 'the outcome in terms of publications is not there yet, I am hopeful it will be quite important for my career.' Along the same lines, a senior researcher from Greece anticipates that 'COST related publications will certainly contribute to my CV and possibly to my career.'

As is clear from these quotations, the majority of respondents see a clear relation between their engagement in research networking and the furthering of their academic career: numerous female scientists involved in the study at hand expect their involvement in COST to have positive consequences for their career. 'The COST project adds an international dimension to my academic career, which is appreciated' says, for instance, a Bulgarian senior researcher. A Greek scientist asserts that participating in research networking 'put me in touch with a pool of leading specialists from disciplines beyond my own, and through our collaboration I felt that I forged professional connections that could help advance my career in the future beyond the COST Action working context.' In addition,

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more junior researchers experience these benefits: 'It is likely it will have an impact on my career, since I got contacts with a leading European university through the COST Action. It might also encourage me to apply for research fellowship abroad', explains for instance a Lithuanian PhD candidate.

Even more than that – one third of all respondents claim to have already experienced direct positive impacts of their COST involvement on their career, resulting in a professional advancement. 'When I was a candidate for professorship, the fact that I have participated in a European Programme like COST was a very positive thing', explains a Greek professor. But also female scientists at the beginning of their academic career experience positive impacts of their network engagement. A British PhD candidate explains that her involvement in this international networking 'led to increased job opportunities'.

Thus, besides the notable and very important opportunities of meeting peers, exchanging knowledge and deepening one's knowledge, the engagement in international networking activities also has very clear and tangible positive consequences for the careers of the female scientists. This finding is extremely encouraging and calls for further efforts to encourage women to actively participate in research networking.

In the past, male researchers used to be better in networking than women. Today, however, Etzkowitz acknowledges that 'traditional female socialisation emphasised relationship-building and networking skills have become increasingly important, both within traditional research fields increasingly dependent on long-distance collaboration and in the new venues of sciences that are typically networked organisations' (Ref. 8, p. 3). In the same spirit, other studies also suggest that women in science and technology can benefit more from flexible lateral structures, such as networking activities, than from hierarchical ones. The COST study confirms these findings, encouraging female scientists to engage further in scientific networking. The very concrete benefits of this engagement are best summarised in the statement of a British professor:

> It will provide me with far wider access to intellectual ideas from across the European region than I could have achieved in any other way. This is likely to make a major contribution to my own research and the development of my own thinking. I expect this Action to provide the intellectual basis of future research for me over the next decade at least. It will identify possible collaborative teams for future research projects. It will identify possible collaborative teams for future publications. It will add to my career profile in the process of applying for promotion.

Certainly, these potential benefits apply for women as well as men. However, taking into account the general situation of women in science, as described earlier in this article, the participation in international networking activities can help women to significantly strengthen their positions as researcher at home and abroad, to expand their networks and to foster their academic careers. As the study shows, these

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benefits do not only apply for researchers in the early phases of their career, but also extend to more established, senior scientists. Thus, women in science, network!

References

1. European Commission (2003) *Waste of Talents: Turning Private Struggles into a Public Issue – Women and Science in the Enwise Countries* (http://ec.europa.eu/research/science-society/women/enwise/enwise_report_en.html).
2. European Commission (1999) *Women and Science – Mobilising Women Scientists to Enrich European Research* (http://ec.europa.eu/research/science-society/pdf/g_wo_co_en.pdf).
3. European Commission (2006) *She Figures 2006: Women and Science – Statistics and Indicators* (http://ec.europa.eu/research/science-society/pdf/she_figures_2006_en.pdf).
4. European Commission (2009) *Preliminary Results of She Figures 2009* (http://ec.europa.eu/research/science-society/document_library/pdf_06/preliminary-results-of-she-figures-2009_en.pdf).
5. Research EU (2009) Women and Science – The march towards equality (http://ec.europa.eu/research/research-eu/pdf/research_eu_women_en.pdf).
6. European Commission (2008) *Benchmarking Policy Measures for Gender Equality in Science* (http://ec.europa.eu/research/science-society/document_library/pdf_06/benchmarking-policy-measures_en.pdf).
7. Accenture (2006) The Anatomy of the Glass Ceiling – Barriers to Women's Professional advancement (http://www.accenture.com/countries/switzerland/research_and_insights/studieadvancement.htm).
8. H. Etzkowitz (2007) The 'Athena Paradox': bridging the gender gap in science. *Journal of Technology Management & Innovation*, **2**(1).

About the Author

Julia Stamm studied social and political sciences at the European University Viadrina in Frankfurt/Oder (Germany) and at the Institut d'Etudes Politiques in Lille (France). From 2004 to 2006, she was a PhD researcher at the Centre Marc Bloch in Berlin/Germany, a Franco-German research centre for social sciences. In 2006, she obtained her PhD (with honours). During her PhD period, she was awarded scholarships from the European Doctoral College in Strasbourg/France, the DAAD (German Academic Exchange Service) and the BMBF (German Ministry for Education and Research). In addition to her academic activities, she served as project coordinator and expert on European affairs and communication for a non-profit association in Berlin. Since 2006 she has been a Science Officer for the Domain of Individuals, Societies, Cultures and Health (ISCH) at the COST Office in Brussels (Belgium), managing over 20 international research networks in the social sciences and humanities. She presently is a guest lecturer at the European University Viadrina where she is teaching 'career paths in Europe'. Her research interests include political sociology, elite sociology, career patterns and European integration.

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