Not a welcoming place

A new study sheds light on the situation of women scientists and engineers in the private sector

It is becoming increasingly undeniable that more women than men leave academic research. A string of publications have detailed the problem, looked at the reasons and highlighted the economic consequences of the high attrition rate among female scientists. Both the US National Science Foundation (NSF; Arlington, VA, USA) and the European Commission (EC; Brussels, Belgium) have expressed concerns that the disappearance of highly skilled women from academic research causes a considerable drag on economic performance and inhibits economic growth (EC, 2006; NSF, 2004, 2006). Most of these studies have focused only on publicly-funded academic research; however, it seems that the private sector is facing the same problem, according to a recent study on the attitudes and perceptions of women in science, engineering and technology (SET) companies (Hewlett *et al*, 2008).

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Released in May 2008, *The Athena Factor: Reversing the Brain Drain in Science, Engineering, and Technology*, the final report of the Center for Work-Life Policy (New York, NY, USA), shows that although 41% of scientists, engineers and other skilled technology workers on the lower rungs of the corporate career ladder are female, there is a dearth of women at higher positions, which mirrors the situation in academic research. "While considerable research has investigated the situation of women in academic research, women in the private sector have been largely ignored and their problems are poorly understood", said Laura Sherbin, Director of Research at the Center for Work-Life Policy and co-author of the study.

The implication of the study is that there is a serious problem in the private sector.

Although SET companies are struggling with a shortfall of skilled workers and can ill afford such a brain drain, roughly 52% of women between the ages of 35 and 40 leave their jobs largely because of "hostile work environments and extreme job pressures", according to the study. These losses are distributed unevenly across various jobs and companies; nonetheless, the drop-out rate is considerably higher among women than among men.

The study was sponsored by the US companies Alcoa (Pittsburgh, PA), Cisco Systems (San Jose, CA), Johnson & Johnson (New Brunswick, NJ), Microsoft (Seattle, WA) and Pfizer (New York, NY), and examined the career trajectories of women in private-sector SET companies. It consisted of four surveys—one online and three company surveys—28 focus groups at various locations in the USA, Switzerland, Hong Kong, the UK, Russia, China and Australia, and numerous one-on-one interviews. The online survey polled more than 2,400 respondents, whereas the company surveys represent answers from 1,910 respondents—both men and women in both cases.

The surveys uncovered several reasons for the attrition rates among women in SET jobs, including a male-dominated environment that does not cater for women, especially those with families. Flexible time is often not an option, which punishes women in particular, many of whom carry the double weight of work and family.

Although the study did not clearly define discrimination or sexual harassment in the work place, 63% of female respondents said that they had experienced behaviour in the job that they described as sexual harassment. Furthermore, many of these women were the only female worker in the department. The finding that these women opt out of the workforce or move on to other jobs is therefore not surprising, Sherbin said.

The responses to the Athena Factor surveys describe a work-place culture that is unresponsive of, and often hostile towards, women: 64% of women scientists complained that

they had to spend relentlessly long hours at work; 43% of female engineers said their male colleagues avoided women or assumed that they were not intelligent enough to succeed in technical fields; and 33% of female engineers said they struggled with a 'hard-hat culture' in which male colleagues regularly used 'locker room' language or sexual innuendo.

This macho culture excludes women from the real decision-making and many are also discouraged from participating at work by demeaning or degrading behaviour. The report quotes Sarah, a young technologist who is being groomed for a top job at her present company, as saying: "I'm used to being the only woman in the room, but I can't get used to vulgarities. I have a son, and I would never want him to behave like this—constantly using foul language and sexual innuendos. This behaviour makes me not want to participate on team projects." It goes on to say that Sarah spoke with the vice president of human resources at her company, who, she said, told her: "You can't succeed and maintain your way of doing things; you have to try harder to become one of the boys" (Hewlett *et al*, 2008).

Indeed, many of the women who participated believed that this macho behaviour flourishes because company executives condone it. Sarah's colleague, Lindsey, is reported as commenting: "There's a feedback loop that encourages macho behaviour, and it exists at the most senior executive level. The guys at the top set the tone for everyone else. As a woman, you have to develop armour plate."

Isolation and "mysterious career paths" also take their toll, according to the study. "A woman in SET can be the lone woman on a team or at a site. This makes it difficult to find support or sponsorship (45% lack mentors; 83% lack sponsors)". As a result of this, women in SET have a hard time figuring out exactly how to progress their careers: 40% of respondents actually reported feeling 'stalled' or 'stuck'.

These oppressive work places—which the authors of the study dubbed as "lab coat", "hard-hat" and "geek" cultures—are often

exclusionary and even predatory for women: 63% of respondents felt they had experienced sexual harassment. Sherbin noted that “They all felt like actual predatory behaviour doesn’t really happen that often. But when we were in a focus group of engineers, they all came up with this term ‘whistle check’. They said they checked the mirror each morning to make sure they weren’t dressed in a way they were going to be whistled at. That goes beyond an atmosphere that’s not supportive. That’s a hostile atmosphere.”

Overall, Sherbin said that she felt a little as though she had travelled through a time warp when interviewing focus-group respondents and compiling results: “You think some of those things don’t happen anymore, but these women face them every day.” She was surprised to find an outdated work-place culture that was commonly found a decade or more ago in other professions.

However, some women with experience of working in SET jobs do not necessarily agree with the findings and sweeping conclusions of the Athena

Factor study. Claudine Jalajas, for example, is a technical writer who has had several technology jobs throughout her career. She has been active with the Long Island Women’s Network (Long Island, NY, USA), the National Association of Women Business Owners (McLean, VA, USA) and the Society for Technical Communications (Arlington, VA, USA), and does not think that discrimination against women is a general problem in her sector. “I’ve never ever had a man look down on me in the tech world”, she said. “I think women are often afraid of the men or avoid them or are too quick to blame them.”

Phoebe LeBoy, President of the US Association for Women in Science (Washington, DC, USA) and a retired Professor of Biochemistry from the University of Pennsylvania (Philadelphia, PA, USA), criticized the Athena Factor study for the methodology and the way that it presents its findings. Perhaps the women interviewed for the study did not care to advance within their jobs or careers, she said, and the study itself gives no answers. Similarly, the proportion of respondents with

post-doctoral training who anticipated career advancement is not specifically delineated, she noted. Moreover, the study “lumps together all women who have had some training in SET fields [...] That decreases the chances of getting at what’s really going on in industry”, LeBoy commented.

Although her colleagues at the Association for Women in Science agree that women in the sciences have a tougher time, they feel that those in the biotechnology field might be the exception: “The suspicions on my part and many of my colleagues [are] that biotech is a better place for women scientists to work because of two reasons”, LeBoy said. “The corporate structure wasn’t set up until 20 years ago, so it doesn’t have a history of being designed by men for men. And also the structure is a much more horizontal one where there is a great deal of responsibility spread out at lower levels.”

In fact, the Athena Factor study reports that biotechnology companies in general tended to have a less macho culture than other SET jobs: 5% of female scientists in biotechnology companies complained about

working in a male-dominated environment, compared with 22% of respondents overall. Moreover, female scientists in the biotechnology industry are more likely to have children—implying that it is more ‘family friendly’—than women in other SET jobs: 48% in biotechnology compared with 33% across all SET sectors.

However, Sue Rosser, Dean of the Ivan Allen College of Liberal Arts at the Georgia Institute of Technology (Atlanta, GA, USA), commented that her recent research supports the findings of the Athena Factor report. On the basis of work by Rainer Frietsch and colleagues at the Fraunhofer Institute for Systems and Innovation Research in Karlsruhe, Germany, and by Fiona Murray, Professor of Career Development at the Massachusetts Institute of Technology (Cambridge, MA, USA), Rosser has uncovered a dearth in the number of women in the USA who receive patents. Although specific numbers are hard to track down, a search of patent applications and attendant interviews with venture capitalists has shown that women are mostly absent when it comes to turning research into marketable products, Rosser explained at an inclusive science conference at the College of St Catherine’s in St Paul (MN, USA) in June 2008.

Confirming the findings of the Athena Factor study, Rosser found that women are less willing to put aside family obligations or to work long hours. Yet it was the interviews that she conducted with venture capitalists in Silicon Valley in California, USA, as part of her research that really hammered home what women are up against. “They have stereotypes that almost come straight out of the 1950s”, Rosser said. “They’re recreating networks that were very much what the [US National Academy of Sciences] was like before so many women joined the Academy in the 1950s. It’s a recreation of the boy’s-club atmosphere.”

The Athena Factor report goes further than just providing an overview of the career situation and work satisfaction of women in SET jobs; it also outlines initiatives that companies can use to help women to balance work and family, and to thrive in their jobs. The study features 14 company initiatives—some still at an early experimental stage—which range from those intended to end female isolation to those that help young female multicultural employees to attain senior management jobs. These initiatives are

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likely to allow many more women to stay on track in their careers, Sherbin said. Moreover, the survey data also show that having women in higher positions can have a tremendously positive effect on other women—as few as 10% of women in management could already make a difference, the report indicates. “Having more senior women helps a lot”, a junior technology woman in one of the focus groups was quoted as saying.

In particular, the Athena Factor study presents Genzyme—a biotechnology company in Boston (MA, USA) that specializes in therapies for rare inherited disorders and other diseases—as a company that has successfully recruited, supported and retained female scientists. In 2006, 56% of newly hired employees at Genzyme were women, and 50% of its scientific staff members were women, as were 42% of its senior managers. On the basis of focus groups held at Genzyme in October 2007, the Athena Factor study offers an explanation for why this biotechnology company is a welcoming place for women. For one thing, biology seems to be more attractive to women than the other sciences—53% of graduate degrees in the biological sciences now go to women. On top of this, however, the corporate culture at Genzyme makes specific efforts to care for employees, both male and female, the study finds. “In focus groups, women talked about feeling cared for as people, not just as profit makers”, the report notes, and managers at Genzyme are known for helping women to deal with clashes between work and family responsibility. One woman with two small children told the Athena Factor researchers that she learned the night before she started a new job at Genzyme that she would be spending the first 6 months at a different site than originally planned, which would require new day-care arrangements. When she explained that to her manager, he told her not to worry: the company would “make it work”. She had to undertake the 6 month training, but was encouraged to leave work slightly early each day to get home to her children. In addition, a senior manager kept in regular contact to ensure the arrangement was working for her and her family.

Such investments inevitably pay back both for companies and society as a whole. Reducing the attrition rate of female SET workers by just 25% would add 220,000 highly qualified SET workers to the workforce in the USA alone, according to the Athena Factor report. Yet, ending discrimination all together is another matter. “A culture dominated by one group will reflect that group’s interests and methodologies”, said Cynthia Norton—an instructor in the Biology Department at the College of St Catherine’s—at the inclusive science conference. “Science is dominated by white males, so science roles themselves are biased.” This leads to direct or indirect discrimination, either because women cannot live up to the male hard-working role model or because they find the working environment unsuitable for combining a family and career.

The main problem, however, does not necessarily lie within the scientific community or with private businesses but within the structure of society, as noted by Gerlind Wallon, Deputy Executive Director of the European Molecular Biology Organization (EMBO; Heidelberg, Germany) and co-author of a study that investigated the careers of women in the biological sciences (Ledin *et al*, 2008). “My thought is what you really need is a cultural revolution. If you look in detail at our study, it comes down to your family”, she said. “Things are changing slowly, and more men are taking responsibility for children, but still more as a favour than as a real obligation [...] It’s something that needs to change throughout our society, it’s not specific just to science.”

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