Women in Knowledge Triangle

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- Some Results from “Meta Analysis of Gender and Science”
“The 21st Century will be a time of rapid innovation and technological change that will be spurred on by the grand challenges that we face, including climate change and the demands of an ageing society.”

Hermann Hauser, “The Current and Future Role of Technology and Innovation Centres in the UK”

Will there be a substantial role to play for Women?
Introduction Women in HE

Gender inequality issue is a problem which is as old as human history and we have reasons not to be overoptimistic in our expectations when we remember that women were accepted to colleges and universities only 150 years ago.

We should be patient and persistent about reaching the substantive improvements that we seek. One can hope that in an era of accelerating change, gender mainstreaming will eventually come to be actualized.

- Women now constitute about 50% of first degree students in many countries all over the world (Massification).
- There are considerable variations in the proportion of women students between disciplines (Horizontal Segregation).
- The percentage of full professors who are women is very low worldwide, for the most part, below 15% (Vertical Segregation).
Figure 3.2: Proportions of men and women in a typical academic career in science and engineering, students and academic staff, EU-27, 2002/2006

Definition of grades:
A: The single highest grade/post at which research is normally conducted.
B: Researchers working in positions not as senior as top position (A) but more senior than newly qualified PhD holders.
C: The first grade/post into which a newly qualified PhD graduate would normally be recruited.

ISCED 3A: Tertiary programmes to provide sufficient qualifications to enter into advanced research programmes & professions with high skills requirements.
ISCED 6: Tertiary programmes which lead to an advanced research qualification (PhD).

SET fields of education = 400 Science, maths and computing + 500 Engineering, manufacturing and construction.
SET fields of science = Engineering and Technology + Natural Sciences.

Source: Education Statistics (Eurostat); WIS database (DG Research)


Date unavailable: ISCED 6 students 2002: DK, EE, FR, LU, NL, SI (Women); WIS 2006: BG, EE, EL, FR, LV, LU, HU, RO, IE (Grade A); 2002: BG, EE, EL, ES, LV, LU, HU, RO, IE (Grade A)
Provisional data: ES
Date estimated: EU-27 (by DG Research) for WIS, ISCED 6 students, SI

Head count (Grades A, B, C)
NO: before 2007 biannual data
Figure 3.5: Glass Ceiling Index, 2004/2007

Source: WIFS database (DG Research); Higher Education Authority for Ireland (Grade A)


Data unavailable: 2004: LU, IE, HR; 2007: EE, EL, MT, PT; Grade C unavailable for BG, RO (included in B)

Break in series: CZ (2005)

Provisional data: ES

Data estimated: EU-27, EU-25, EU-15 (by DG Research), SI

Head count
Some differences exist in coverage and definitions between countries
Country with small numbers of academic staff: CY, MT, LU, IS
NO: before 2007 biannual data
Data for Ireland on Grade A professors does not include the Institutes of Technology
Mediterranean Basin

We have carried out a pilot study on the female researchers in the EU(MS+AC) Mediterranean HEA: Portugal, Spain, France, Italy, Malta, Croatia, Slovenia, Greece, Turkey and Cyprus.

We have aimed to map the situation of female researchers with special regards to gender differences in research careers and critical areas where women are underrepresented.

We have observed the important variations among the Mediterranean countries in this underrepresentation and the peculiarities observed in SET.

Women in Research

Proportion of female researchers, 2006

<table>
<thead>
<tr>
<th>Country</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td>44</td>
</tr>
<tr>
<td>PT</td>
<td>44</td>
</tr>
<tr>
<td>ES</td>
<td>37</td>
</tr>
<tr>
<td>TR</td>
<td>36</td>
</tr>
<tr>
<td>EL</td>
<td>36</td>
</tr>
<tr>
<td>SI</td>
<td>35</td>
</tr>
<tr>
<td>IT</td>
<td>33</td>
</tr>
<tr>
<td>CY</td>
<td>32</td>
</tr>
<tr>
<td>FR</td>
<td>28</td>
</tr>
<tr>
<td>MT</td>
<td>26</td>
</tr>
<tr>
<td>EU-27</td>
<td>30</td>
</tr>
</tbody>
</table>
Women Researchers by sector

Proportion of female researchers by sector, 2006
Women researchers in HE Sector

Proportion of female researchers in the Higher Education Sector by field of science, 2006
Proportion of Women in Grade A Position 2002-2007

[Bar chart showing the proportion of women in Grade A positions in 2007 and 2002 for various countries, with 2007 in blue and 2002 in red.]
Proportion of academic staff by grade and total 2007
## Turkish Case

### Proportion of Women Academics 2003-2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Prof.</th>
<th>Assoc.Prof</th>
<th>Asst. Prof</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-2004</td>
<td>25.64</td>
<td>32.82</td>
<td>30.20</td>
</tr>
<tr>
<td>2004-2005</td>
<td>26.54</td>
<td>31.67</td>
<td>31.15</td>
</tr>
<tr>
<td>2006-2007</td>
<td>27.12</td>
<td>30.99</td>
<td>33.15</td>
</tr>
<tr>
<td>2009-2010</td>
<td>28.00</td>
<td>34.00</td>
<td>46.00</td>
</tr>
</tbody>
</table>
# Leaking pipelines

<table>
<thead>
<tr>
<th></th>
<th>Sweden</th>
<th>Turkey</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhD degrees</td>
<td>50%</td>
<td>42%</td>
</tr>
<tr>
<td>First academic employment</td>
<td>41%</td>
<td>33%</td>
</tr>
<tr>
<td>Associate professors</td>
<td>38%</td>
<td>31%</td>
</tr>
<tr>
<td>Professors</td>
<td>20%</td>
<td>27%</td>
</tr>
<tr>
<td>Rectors</td>
<td>45%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Female Representation in Computer Science

• An important fact has been outlined on the Male “Overrepresentation Factoring” in computer science (Ingra Kiderra, 2005).

• According to the research which has been conducted at the University of California, Turkey has the minimum

• “Male Overrepresentation Factor” (1.79) among 21 countries (Australia, Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Korea, Netherlands, New Zealand, Norway, Slovakia, Spain, Switzerland, Turkey, United Kingdom, United States).
### ITU Case: Proportion of Female Academics

<table>
<thead>
<tr>
<th>Position</th>
<th>1994-95</th>
<th>1999-00</th>
<th>2004-05</th>
<th>2009-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor</td>
<td>16%</td>
<td>20%</td>
<td>29%</td>
<td>32.0%</td>
</tr>
<tr>
<td>Assoc. Prof</td>
<td>31%</td>
<td>35%</td>
<td>36%</td>
<td>41.6%</td>
</tr>
<tr>
<td>Assist. Prof.</td>
<td>28%</td>
<td>38%</td>
<td>46%</td>
<td>38.6%</td>
</tr>
<tr>
<td>Research Assist.</td>
<td>20%</td>
<td>35%</td>
<td>37%</td>
<td>44.7%</td>
</tr>
<tr>
<td>Total</td>
<td>28%</td>
<td>31%</td>
<td>36%</td>
<td>39%</td>
</tr>
</tbody>
</table>

Saglamer, 2008
ITU Case: Proportion of Female Graduate Students

**Master Degree Students**

<table>
<thead>
<tr>
<th>Year</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1810 (40.6%)</td>
<td>4458</td>
</tr>
</tbody>
</table>

**PhD Students**

<table>
<thead>
<tr>
<th>Year</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>815 (41.6%)</td>
<td>1961</td>
</tr>
</tbody>
</table>
Hierarchical structures

Careers at the faculties of engineering, (2004/2005)

Hungarian Science and Technology Foundation, Budapest University of Technology and Economics – BME Hungary, Medical University of Graz – MUG Austria, Istanbul Technical University – ITU Turkey, Semmelweis University – SE Hungary, Tallinn University of Technology – TUT Estonia, University of Oulu – OUL Finland, University of Tor Vergata – URTV Italy - Rome
Some Facts about Success Rates

• Female Students Ratio  %30 in  2008-2009

• Students average grades in 2008-2009
  – Autum Term  2.60(F)  2.12(M)
  – Spring Term  2.54(F)  2.06(M)

• Top 3 in Graduations in 2008-2009
  – First  %39 Female
  – Second  %52 Female
  – Third  %40 Female
  – Total  %44 Female

Proportion of Female students in HE Turkey 2010
44% of total HE students are Female
46% of total graduating students are Female
49% of total graduate programme students are Female
<table>
<thead>
<tr>
<th></th>
<th>ARI TECH</th>
<th>TOTAL</th>
<th>ARI TECH%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATENTS</td>
<td>111</td>
<td>235</td>
<td>47%</td>
</tr>
<tr>
<td>Trademarks</td>
<td>116</td>
<td>314</td>
<td>37%</td>
</tr>
<tr>
<td>R&amp;D Budget (TL)</td>
<td>86,833,435</td>
<td>190,730,820</td>
<td>45%</td>
</tr>
<tr>
<td>R&amp;D Income from</td>
<td>67,927,991</td>
<td>79,468,810</td>
<td>85%</td>
</tr>
<tr>
<td>Export ($)</td>
<td>118,287,712</td>
<td>243,187,140</td>
<td>49%</td>
</tr>
</tbody>
</table>

Resource: T.C. Cumhurbaşkanlığı Devlet Denetleme Kurulu, 4691 sayılı Teknoloji Geliştirme Bölgeleri Kanunu Uygulamalarının Değerlendirilmesi ile Uygulamada Ortaya Çıkan Sorunların Çözümüne İlişkin Öneri Geliştirmesi, EK 1 İstatistiki Bilgiler Grafikler
ITU - ARI Technocity

ARI Technocity hosts 78 R&D companies
5 R&D company have women CEO among 78

Total R&D staff  2648
  657 Women

Researcher  1990
  494 Women
Some Observations

- The proportion of female students at every level of HE keep increasing
- Female students’ interest on SET is also increasing but slower than the increase in HE in general
- Success rates of female students are higher than males in many countries
- BUT

- Female students tend to concentrate on certain fields of study areas
- Promotion of Female academics is a leaky pipeline
- Female researchers have less ambition to be in leading positions and credits that they achieve usually go to male boss
- EO policies having marginal effect in terms of access and employment - academic merit
- Lack of strong commitment for equity policies in the institution
How to maximise innovation potential

Is it possible?

“Maximising innovation potential through diversity in Research Organisation”

YES possible if we are able

- To decide to use human capital efficiently and effectively
- To prepare the conditions for this transformation (legal, financial, social&cultural)
- To create gender friendly environment
- To remove barriers for every kind of segregation
- To empower and strengthen the capacity of women to be able to compete in equal conditions with self confidence
“Meta-analysis of Gender and Science Research”
Topic Report: Policies towards Gender Equality in Research

Setting the Scene

The meta-analysis is based on the entries in the Gender and Science Database classified under “Policies towards gender equality in research”. The available 1296 abstracts in English provided a first orientation for in-depth study of selected texts.

Three different large policy fields in science and technology; have been distinguished;

1. research policies,
2. innovation policies.
3. human resources policies

Main Trends i;

- Positive Actions
- Gender Mainstreaming
- Evaluation of Measures

Historically there has been an evolution from positive actions toward mainstreaming.
Methodology & Main Trends

The three thematic areas:
- Advancing science careers
- Science management and reform
- Gender dimension in research and HE

The topics in thematic areas are classified under 8 headings
- horizontal sg.,
- vertical sg.
- pay gap,
- stereotypes and identities,
- science as labour activity,
- scientific excellence,
- gender dimension in research content
- policies towards gender equality in research content
Advancing Women’s Science Careers

Policies and programmes for supporting women in science career;
- Career Training and Development
- Qualifications Stipends,
- Scholarships & Positions
- Networking and Mentoring
- Measures for Work-life Balancing

Drop-out rates at Ph.D level is very high
Drop-out rates vary in different fields, different sectors,
different institutions, different countries
Advancing Women’s Science Careers
Concluding Remarks

1. The impact of equality measures depends on the historically grown specific culture and disciplinary requirements in place.

2. Career development for women scientists needs to be combined with changing the science culture at large and should not be modelled according to male shaped job and life patterns.

3. The institutional level of involvement emerged as a key aspect for the success and real impact of policy measures. This is apparent in the way women were able to participate in the decision making process.

4. There is a need to rethink the linear model of the science career. Despite the fact that career breaks are penalized in science, there might be untapped possibilities and potentials for women entering science.
Science Management & Reform

Gendered aspects of institutional reform include:

- Legislation
- Equality Officers, Committees & Observatories
- Quotas
- Targets, Incentives & Gender Budgeting

Quotas appear as a very effective instrument to increase the number of women. On the other hand, they are seen as interfering with the supposedly objectivity and neutrality of scientific knowledge as well as being in conflict with justice arguments.

Direct positive measures such as women’s quotas for full professorship or earmarked stipends for female candidates etc. Often are disqualified as inferring with neutrality and meritocracy of science.

A quite contradictory picture emerges from the reviewed literature; The new steering instruments as target setting, audits, quality control and performance measures were described as disadvantageous for women academics.
Gender Dimension in Research & HE

For the Integration of gender into all aspects of education and research;

- Reforming teaching methods and rethinking curricular content
- The organisation of the educational setting
- Different model of science and knowledge production

“Gender at large becomes here tied to a process of modernisation of HE and Research not only in the sense of uncovering male power structures but also in terms of improving the quality and diversity of knowledge”
Summary of Major Gaps/ Recommendations

The individual gaps pertaining to each thematic section have been grouped according to the three topics;

• Need for common quality standards for evaluation
• Need for theory and interdisciplinarity
• Need for research on long-term effects

Recommendations

“The key challenge is not to change women but, on the contrary, to change the culture of science and research. This change would concern not only the definition and assessment of excellence but also issues related to work-life balance.”

In the end, the new EU perspective about gender and science involves the idea that gender policy is not only made by regulations and legal changes but mostly by leadership and commitment to change structures and cultures.
Thank You

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References

Hermann Hauser, 2010, “The Current and Future Role of Technology and Innovation Centres in the UK”

Tan, M., Saglamer, G., Atalay, O., 2011, Women in Science, Engineering and Technology (SET) in Mediterranean Basin, SEFI Annual Conference Lisbon

UNICAFE, Survey of the University Career of Female Scientists at Life Sciences versus Technical Universities, UNICAFE is supported by funding under the Sixth Research Framework Programme of the European Union SAS6-CT-2006-036695

Saglamer, G., 2008, Beyond the Glass Ceiling Women Academics in Science, Technology and Engineering “Leading Universities in the Twenty-First Century, Centennial Conference of the National University of Ireland, 1-3 December 2008, Dublin

Saglamer, G., 2009, Beyond the Glass Ceiling Women Academics in Science, Technology and Engineering with special reference to Turkey, “changing research landscape to make the most of human potential 10 years of EU activities in “Women and Science” and BEYOND, 2009 SEFI Annual Conference, Rotterdam


She Figures, 2006, 2009, Women and Science Statistics and Indicators

T.C. Cumhurbaşkanlığı Devlet Denetleme Kurulu, 4691 sayılı Teknoloji Geliştirme Bölgelere Kanunu Uygulamalarının Değerlendirilmesi ile Uygulamada Ortaya Çıkan Sorunların Çözümüne İlişkin Öneri Geliştirmesi, EK 1 İstatistiği Bilgiler Grafikler