Commitee on Women in Engineering (WIE)

Engineering Strategic Indicators

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Topic Overview

The main aim of this session is to focus on statistics and databases on women in engineering and opportunities in the job market.

A persisting gender gap is unfortunately the fil rouge affecting women both in studies activities and job.
World data on women in engineering
Unesco underlines that large improvements in enrolment at all levels, among girls and women, have been done in the last years both in developing and developed regions.

Gross enrolment ratios: Number of students enrolled in a given level of education, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education. For the tertiary level, the population used is the 5-year age group starting from the official secondary school graduation age.

Source: Unesco data processed by Centro Studi CNI
Nevertheless, women are still underrepresented in tertiary field of studies related to science and engineering, a heavy condition for an effective future presence of women engineers in the job market.

Source: Unesco data processed by Centro Studi CNI

<table>
<thead>
<tr>
<th>Field</th>
<th>Female %</th>
<th>Male %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering, manufacturing, construction</td>
<td>5%</td>
<td>20%</td>
</tr>
<tr>
<td>Science</td>
<td>7%</td>
<td>12%</td>
</tr>
<tr>
<td>Health and welfare</td>
<td>14%</td>
<td>7%</td>
</tr>
<tr>
<td>Education</td>
<td>18%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Source: Unesco data processed by Centro Studi CNI
Among researchers in the field of engineering, women are still a minority, with some exceptions like in South East Asia and Central Asia.

Source: Unesco data processed by Centro Studi CNI
Unesco statistics counts that female graduates in engineering (data referred to 111 countries) are 5% of total female graduates. Men graduated in engineering are 20% of male graduates.

Source: Unesco data processed by Centro Studi CNI
Unesco data on female graduates in engineering referring to some countries taking part to the present WFEO working group meeting
(average 2005-2012)

Source: Unesco data processed by Centro Studi CNI
OECD Data on women in engineering
(the organization includes 35 member States)
Data on OECD countries confirm a severe gender gap in engineering graduation

Source: OECD data processed by Centro Studi CNI
Gap in employment rate (%) among OECD countries – (2012 or 2015)

<table>
<thead>
<tr>
<th>Field</th>
<th>Female employment rate</th>
<th>Male employment rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering, manufacturing, construction</td>
<td>81</td>
<td>90</td>
</tr>
<tr>
<td>Science, mathematics and computing</td>
<td>83</td>
<td>90</td>
</tr>
<tr>
<td>Social science, business law</td>
<td>82</td>
<td>91</td>
</tr>
<tr>
<td>Health and welfare</td>
<td>84</td>
<td>94</td>
</tr>
<tr>
<td>All fields of education</td>
<td>78</td>
<td>88</td>
</tr>
<tr>
<td>Humanities, languages, arts</td>
<td>79</td>
<td>89</td>
</tr>
<tr>
<td>Teacher training and education science</td>
<td>80</td>
<td>85</td>
</tr>
</tbody>
</table>

Source: OECD data processed by Centro Studi CNI
Some aspects on statistics concerning women in engineering

- Data of quite a large number of countries concerning the flows of women enrolled and graduated in engineering are easily available (Unesco, OECD, ILO);
- Unesco and OECD statistics on University enrolment and graduation (in engineering and other fields of studies) are not always updated;
- Data on women in engineering in some relevant countries, like India or Nigeria are not easily available on international database, like Unesco database;
- Extensive database on women (and men) working as freelance engineers (indipendent workers) are not easy to find.
Data on women in engineering in the European Union databases
Data mining and analysis on women in engineering is easier at a *European scale*

**EU 28 countries** - Female students (ISCED 5-6) enrolled in engineering, manufacturing and construction field - as % of male and female students in these fields

![Bar chart showing the percentage of female students in engineering across years from 2003 to 2014.](chart)

Source: Eurostat data processed by Centro Studi CNI
Some European countries belonging to WFEO

% of female students enrolled in engineering, manufacturing and construction field out of total students enrolled in the same field – year 2014

Though women enrolled in engineering field are still a minority, some progresses have been done in some European countries, where female students are more than 30% out of total students in engineering

Source: Eurostat data processed by Centro Studi CNI
Engineers in the labour market

28 EU countries count 3.5 millions engineers and architects in the labour market. The share of women is 30% in 2016; it was 28% in 2014.

Share of engineers and architects in the labour market (EU 28 countries)

- Working men with a degree in engineering: 70%
- Working women with a degree in engineering: 30%

Source: Eurostat data processed by Centro Studi CNI

Eu statistics do not separate engineers and architects.
The highest number of women in engineering in EU is concentrated in the following countries.

Number of working women with a degree in engineering or architecture in the EU (thousands) - year 2016

- EU 28 countries: 906,9
- Germany: 205,4
- France: 120,2
- Italy: 103
- United Kingdom: 144,6

Source: Eurostat data processed by Centro Studi CNI
Women in Engineering in Europe

Working women with a degree in architecture or engineering (share out of total women in the same field in EU 28 countries)

- Germany: 23%
- France: 13%
- Italy: 11%
- United Kingdom: 16%
- Rest of Europe 28 countries: 37%

Source: Eurostat data processed by Centro Studi CNI
There is a lack of extensive statistic datasets concerning freelance (self-employed) engineers in different countries or engineers enrolled in National Register o Official professional Association (like in Italy, Austria ecc).

EU database contains the only aggregated number of men and women self-employed in professional activities, scientific and technical activities.

FEANI publishes the number of engineers enrolled in professional Association, with no distinction between men and woman.

WFEO should promote an extensive survey and annual monitoring on women and men belonging to National Register and self-employed market.
Self-employed workers (own-account workers) in professional and technical fields, including engineering in EU 28 countries

Freelance women and men in **professional and technical fields** - Eu 28 countries, year 2015

- Self employed women in professional, scientific and technical filed: 40%
- Self employed men in professional, scientific and technical filed: 60%

Source: Eurostat data processed by Centro Studi CNI
An example:
Italy and women in engineering enrolled in the Albo Ingegneri
The share of women enrolled in the Italian Albo Ingegneri is increasing, but women are still a minority. The Italian Albo counts 33,433 women and 204,733 men in engineering.

Source: Centro Studi CNI
Italian Albo Ingegneri – Women in engineering by field of professional activity

- Civil Engineering and Environmental Eng. (36%)
- Manufacturing Engineering (6%)
- ICT Engineering (3%)
- Civil, Manufacturing, ICT Eng. not separated (55%)

Source: Centro Studi CNI
A quick overview on female empowerment policies and data
Gender gap and female empowerment can be assessed through a wide range of data at global level. However the presence of women with a degree in engineering at high level in corporations or institutions is difficult to be discovered.

A specific scouting on female empowerment concerning engineers should be launched by WFEO, through collaboration among different member countries.

An analysis on policies, laws and best practices supporting female empowerment in WFEO different countries should be launched.
CNI and *Ingenio al femminile* have conducted a specific analysis on female empowerment and women in engineering in Italy.

Share (%) of women in Italian listed companies' board

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>2008</td>
<td>5.9</td>
</tr>
<tr>
<td>2009</td>
<td>6.3</td>
</tr>
<tr>
<td>2010</td>
<td>6.8</td>
</tr>
<tr>
<td>2011</td>
<td>7.4</td>
</tr>
<tr>
<td>2012</td>
<td>11.6</td>
</tr>
<tr>
<td>2013</td>
<td>17.8</td>
</tr>
<tr>
<td>2014</td>
<td>22.7</td>
</tr>
<tr>
<td>2015</td>
<td>27.6</td>
</tr>
</tbody>
</table>

Source: Consob data processed by Centro Studi CNI
Female empowerment data in Italy: an example

Number of female CEO in the Italian listed companies

- 2013: 13
- 2014: 16
- 2015: 16

Source: Consob data processed by Centro Studi CNI
Italy: more than 1,000 women with a role in the board of Italian companies

Share of women in Italian companies’ board, year 2015

- Independent directors: 68%
- Executive directors: 6%
- Minority directors: 7%
- Other: 14%
- CEO: 2%
- Chairmen/honorary chairmen: 3%

Source: Consob data processed by Centro Studi CNI
A very few women in company board are engineers

Source: Consob data processed by Centro Studi CNI
WFEO should implement a monitoring system of data concerning women in engineering starting from wide existing dataset.

Monitoring activities should consider, at a preliminary stage, the main official datasets represented by the following official sources: Unesco, ILO, Eurostat, OECD, UNO, FEANI.

Identification of other relevant sources of data concerning women (and men) in engineering should be implemented.

The main official databases (like Unesco or FEANI) can provide important information concerning engineering, but also reveal specific weaknesses: information are often incomplete. Some relevant countries do not provide clear data on engineering and on women in engineering. WFEO should implement a network composed by a referent for each member country, providing every year a dataset on engineering sector and on women in engineering.

Starting from data on gender gap and female empowerment, WFEO should implement a review on best practices in different member countries.