

Gender in Science and Technology Workforce in Japan

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1. Background

Several measures for gender issues were developed in Japan after the WW2. One year after women first had the voting right in 1945, Japanese Constitution was amended to clearly state the legal equality of all citizens in Japan prohibiting sexual discrimination. However, the careers for women who have graduated university were very much limited in the 1950s, such as to be a school teacher. Hierarchic structure fragmented by gender or academic records embedded in the institutions prescribed the responsibility and salary of workers at that time (Gordon, 2003).

After the Act on Securing, etc. of Equal Opportunity and Treatment between Men and Women in Employment was enacted in 1972, improvement of the workplace environment for women had been promoted. This act aiming to protect women in the workplace had expanded its definition to the promotion of equal employment opportunity for women workers in the 1980s and further to the activity for overall equal opportunity rights in the 1990s.

In 1994, the Headquarters for the Promotion of Gender Equality headed by the Prime Minister was established within the Cabinet which was reorganized to Cabinet Office as a Gender Equality Bureau after the reform of the Central Government in 2001. The Gender Equality Bureau is responsible for overall coordination of plans related to the formation of a gender-equal society, as well as promoting the Basic Plan for Gender Equality across the ministries.

Today, women in Japan are expected to act in the society especially in the context of solving societal issues. One typical case is “the decrease of the labor force caused by falling birth rate and the aging population” and government policy emphasizes the importance of women as valuable labor force. Another is “promotion of innovation” where women are expected to participate in the science, technology and innovation (ST&I) activities in order to diversify the institutions or society in order to trigger innovation.

2. Review of Recent Policy in Japan

2.1 General Gender Policy

Basic Act for Gender-Equal Society was enacted in 1999 and the Basic Plan for Gender Equality is formulated according to this act. The latest basic plan is The Third Basic Plan for Gender Equality (hereafter, referred as the Third Gender Basic Plan) which was formulated in December 2010.

As a major policy target, “increasing the share of women in leadership positions to at least 30% by 2020 in all fields in society”, which was first decided by the Headquarters for the Promotion of Gender Equality in 2003, is emphasized in the Third Gender Basic Plan (Cabinet Office, 2010). “Gender equality in science and technology (S&T) and academic fields” is positioned as one priority field out of fifteen priority fields. The policy target which is described in Table 1 was set in accordance with the S&T Basic Plan.

Table 1. Policy target for proportion of women researchers in the field of S&T

Field	Target in an early date	Final policy target
Target employment numbers (natural sciences)	25%	30%
Science	20%	
Engineering	15%	
Agriculture	30%	
Medicine, dentistry, and pharmacology combined	30%	

Source: Cabinet Office (2010)

2.2 ST&I Policy

S&T Basic Law was enacted in 1995 and the S&T Basic Plan is formulated every five years according to this law. The latest basic plan is the 4th S&T Basic Plan (2011-2015, hereafter, referred as 4th S&T Basic Plan).

In the 4th S&T Basic Plan, gender issue is positioned as one issue of “development of S&T-related human resources” (Cabinet Office, 2011). According to the 4th S&T Basic Plan, “Promotion the active involvement of women researchers” is positioned not only as gender equality but also to activate the institutional R&D activities by diversification of perspectives and ideas. For this purpose, improvement of adoption rate of women researchers and the support system for their research activity is emphasized in the S&T Basic Plan, targeting the ratio of women researchers in the natural science field as 25% which is traced in the Third Gender Basic Plan. Each university and public research institution is “expected” to positively act in order to achieve the target described in the S&T basic plan.

3. Data Analysis

3.1 Education and Fields of Major

In Japan, more women tend to enter upper secondary school and higher education than men, however, this trend reverses in the advancement to the graduate school where the number of men are 2.5 times more than women as described in Table 2. School advancement rate in the upper secondary school stood at 96.9% for women and 96.2% for men. The university (undergraduate course) advancement rate stands at 45.6% for women and 54.0% for men. Since 9.5% students (who is all women) advance to junior colleges, the women’s total advancement rate for higher education is 55.1%. Reversely, the graduate school advancement rate stands at 6.0% for women and 15.0% for men.

Table 2. School advancement rate by type of school in Japan (by gender, FY 2013)

Type of School	Women	Men
Upper secondary school	96.9%	96.2%
University (undergraduate course)	45.6%	54.0%
Junior collage	9.5%	-
Graduate school	6.0%	15.0%

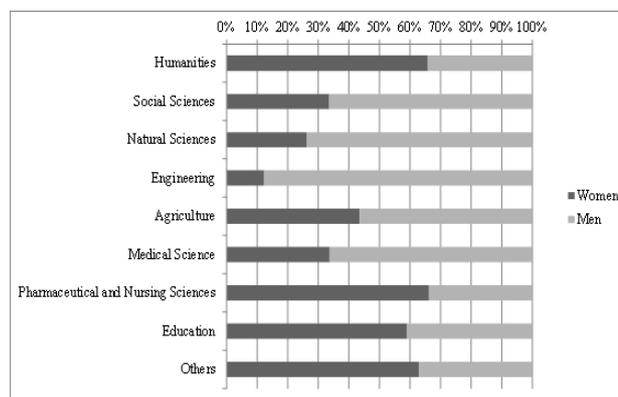
(Notes)

1. Upper Secondary School: Percentage of graduates of lower secondary school and secondary school (lower division) who enter upper secondary school and college of technology (except for upper secondary school-level correspondence courses).
2. University (undergraduate course) and Junior College: Total university or junior college enrollments (including students who had failed the entrance exam but were accepted at a university of their choice in the following year) divided by lower secondary school graduates of three years before. The table excludes students on university-level or junior college-level correspondence courses.
3. Graduate School: Students who enter graduate school immediately after their undergraduate course as a percentage of all students completing undergraduate courses. (It also includes new PhD. course advancement in the case of medical and dental schools). The figure excludes graduate level correspondence courses.

Source: Cabinet Office (2014)

Gender gap seems to exist in the students' fields of major, where women tend to select humanities, pharmaceutical and nursing sciences or education while men tend to select engineering or natural sciences as described in Figure 1. At the undergraduate level, women majoring in the natural sciences and engineering were limited to 26.2% and 12.3% respectively.

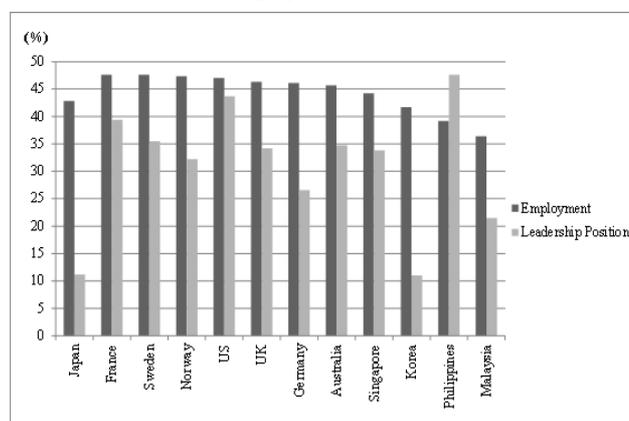
Figure 1. Gender gap in students' fields of major (by gender, FY 2013)



(Note) "Medical Science" includes dentistry.

Source: Cabinet Office (2014)

Figure 2. Percentages of women employment and women in leadership positions



Source: Cabinet Office (2014)

3.2 General Employment Environment

The employment rate of women in Japan is not so low, but the ratio of women worker in leadership positions is rather low compared to other major countries as described in Figure 2. Employment rate of women in major countries are in the range of 36.4% to 47.6% while the rate of Japan is 42.8%. Ratio of women worker in leadership position is in the range of 21.5% to 47.6% except Japan and Korea whose rates are notably low as 11.2% and 11.0%, respectively.

Most of the women in Japan once have jobs but seem to leave after their life events, especially after the birth of her first child. According to the 14th Basic Survey on Birth Trends conducted by IPSS in 2010, 61.0% of housewives who married during 2005 to 2009 continued working while 25.6% left her job after marriage (IPSS, 2010). The same survey also shows that 70.7% of women who had her first child during 2005 to 2009 had jobs before the life event, however, the percentages of women who continued working after the life event dropped to 26.8% (IPSS, 2010).

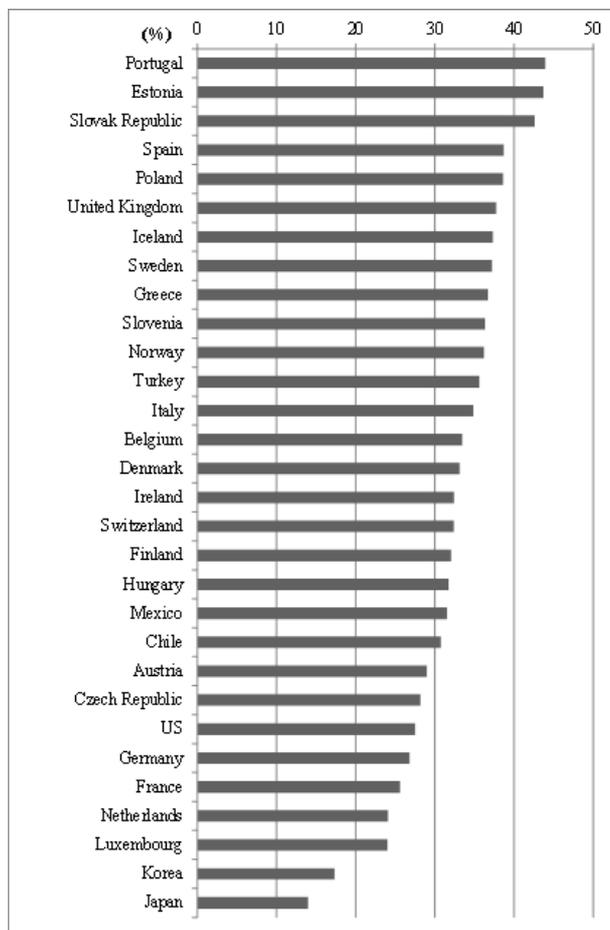
3.3 Research Environment in the Field of S&T

The percentage of women researchers in Japan is 13.97% in 2011 which is the lowest among the OECD countries

whose data is available, as described in Figure 3.

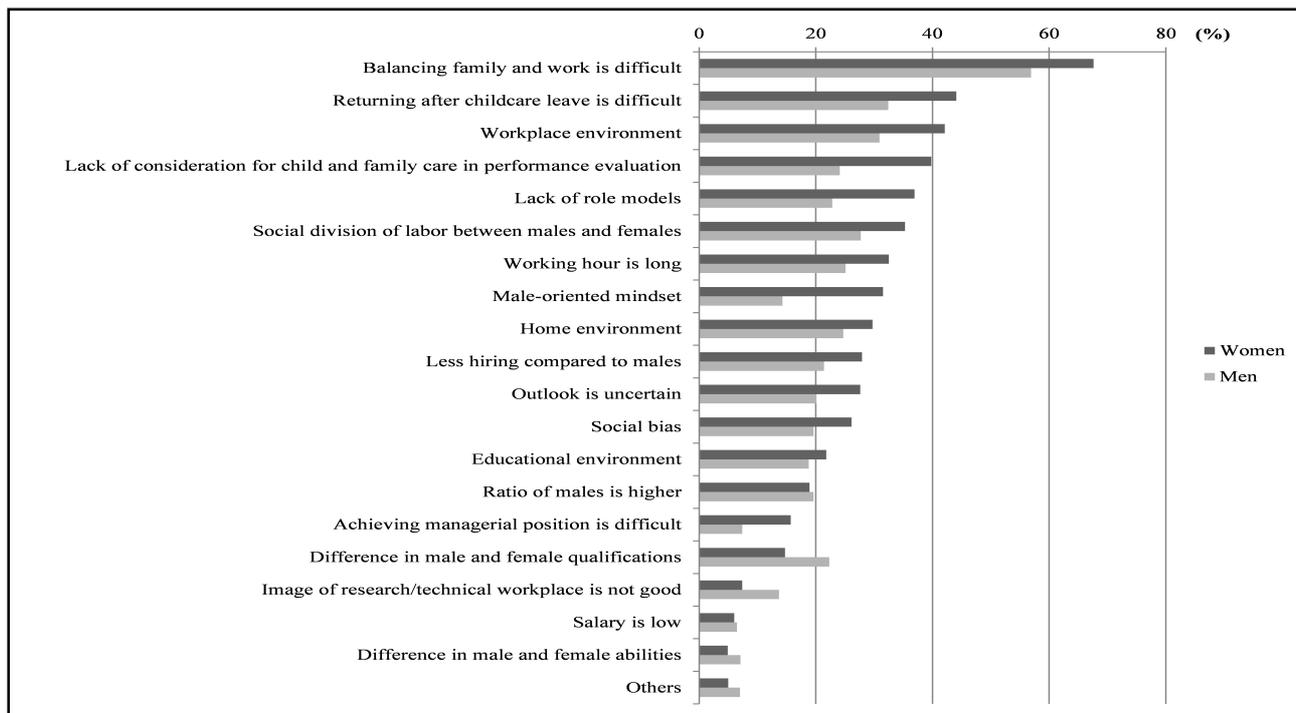
The reason for the low percentage of women researchers in Japan seems to be the difficulty of balancing family and work, especially after having their child. Figure 4 shows the result of survey conducted by Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering (EPMEWSE) concerning the reasons for low percentage of women researchers. The top reason indicated by both genders for the low percentage of women researchers was “balancing family and work is difficult” receiving over 50% of responses. This was followed by “returning after childcare leave is difficult” and “workplace environment” combining for over 30% of the responses from both men and women respondents.

Figure 3. International comparison of the percentage of women researchers (2011)



(Notes) US data is from NSF and others are from OECD. Data for Switzerland is from 2012, US is from 2010, and Mexico is from 2003. Source: OECD (2015), NSF (2014)

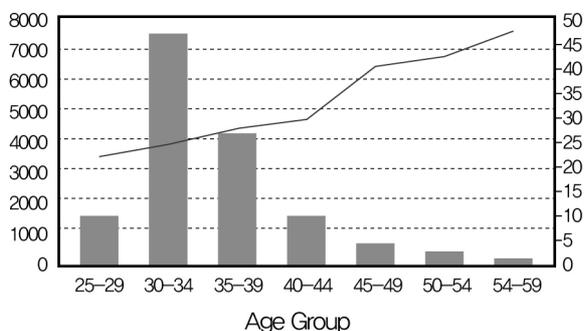
Figure 4. Reasons for low percentage of women researchers



Source: EPMEWSE (2013)

The employment situation for women researchers in Japan seems to be tough compared with men since more women researchers tend to stay as post-docs than men. Figure 5 shows the number of post-doc researchers by age group and also its ratio of women in each age group. The number of post-doc researchers peaks at the age group 30-34 and peaks out after 40 while its ratio of women keep increasing as the age group increase (Kobayashi and Watanabe, 2014).

Figure 5. Number of post-doc researchers by age group with ratio of women



Source: Kobayashi and Watanabe (2014)

4. Discussion

In order to achieve the policy goal described in both Gender and S&T Basic Plans, support for promotion of women researchers throughout their life stage seems to be needed. First, there seems to be a barrier for women to major engineering or natural sciences in universities. Next, both men and women researchers suggest that to balance family and work is difficult for women researchers, especially after having their child. It is necessary to keep women continuing their career to have more women in the leadership positions. Japan Science and Technology Agency (JST), as a leading institution for S&T, established Diversity Promotion Office at 2013 to propose and promote these support system for women researchers aiming to establish sustainable support system toward achieving the policy target of 30% women in the leadership position (JST, 2014). The above mentioned issues are important but do not seem to be specified in the field of S&T, rather have some similarity with the general gender issues.

Another argument, which is the impact of R&D system reform, seems to be needed because this may create tough situation for vulnerable groups such as women researchers who have a child. It is important for researchers in academic field to obtain tenure post in their 30s and this system seems to be creating a tougher situation concerning the "work-life balance" for women researchers, since the average age of women in Japan having her first child is 30.1 in 2011 (MHLW, 2011).

Gender issues in the field of S&T seems to be a mixture of "gender oriented issues" and "issues on R&D system reform". Therefore, discussion on this issue should not be closed in the women researchers' community. Coordination to create linkage between these two issues, "gender oriented issues" and "issues on R&D system reform", is expected for Japan to establish a more effective national R&D system.

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