Report on the MEXT-Commissioned Project in FY2003

Diverse Visions of Scientists and Engineers in the 21st Century —For the Promotion of Gender Equality—

March 2004

Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering (EPMEWSE)

Contents

Chapter 1

Preface

This report summarizes the survey results conducted by the Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering (EPMEWSE) in FY2003.

The survey research project, “Diverse Visions of Scientist and Engineers in the 21st Century —For the Promotion of Gender Equality—” was commissioned to EPMEWSE by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan. EPMEWSE was established by a group of academic societies in the science and engineering disciplines in 2002 in order to promote gender equality in the science and engineering fields. The purpose of this research project was to capture the current status of gender equality in the science and engineering professions through an extensive survey, to understand the current environment surrounding the communities of science and engineering professionals, to identify issues and to propose recommendations.

The Science and Technology Basic Plan for the second term, which was approved by the cabinet in March 2001, emphasized effective usage of human resources and developments of diverse career paths. One of its focuses was to improve the working environment for female professionals in the science and engineering fields. Prof. Akiko Tsugawa (Tokyo Medical and Dental University) published a research report, “Making the Most of Female Researchers’ Abilities in Science and Engineering” [1] regarding this, and other recommendations [2, 3] have been also made on this topic.

We designed and conducted a survey recognizing that the first step toward a gender equal society is to acknowledge the diverse values regardless of gender. We also tried to collect data not only from science and engineering professionals at universities and former national research institutions, but also from corporations, in order to provide broader-based findings for making recommendations. We would also like to note that we made use of the research done by Prof. Tsugawa’s team [1] as reference to design some of our survey questions.

We hope that this report will contribute to the realization of a truly gender-equal society, where diverse values are respected and every person has the opportunity to exercise his/her ability to the fullest, regardless of gender.

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Produced by the Physical Society of Japan (JPS)

***Abbreviations**

JSAP	The Japan Society of Applied Physics	JPS	The Physical Society of Japan
SCEJ	The Society of Chemical Engineers, Japan	MBSJ	The Molecular Biology Society of Japan
SPSJ	The Society of Polymer Science, Japan	SJWS	The Society of Japanese Women Scientists
JSBSS	Japanese Society for Biological Sciences in Space	JSCE	The Japan Society for Comparative Endocrinology
CSJ	The Chemical Society of Japan	JSDS	The Japanese Society of Developmental Scientists
AESJ	Atomic Energy Society of Japan	JSCB	Japan Society for Cell Biology
JSPP	The Japanese Society of Plant Physiologists	IEICE	The Institute of Electronics, Information, and Communication Engineers
MathSJ	The Mathematical Society of Japan		
JBS	The Japanese Biochemical Society	ESJ	Ecological Society of Japan
BSJ	The Biophysical Society of Japan	JFS	Japanese Forestry Society
PSSJ	Protein Science Society of Japan	MgSJ	The Magnetics Society of Japan
PSJ	Physiological Society of Japan	ISIJ	The Iron and Steel Institute of Japan
ASJ	Astronomical Society of Japan	JGS	The Japanese Geotechnical Society
ZSJ	The Zoological Society of Japan		

The First Significant Study in the World

Masako Bando, EPMEWSE Chairperson

EPMEWSE was established on October 7, 2002 by academic organizations in the science field, in response to suggestions by the presidents of The Physical Society of Japan (JPS), The Japan Society of Applied Physics (JSAP), and The Chemical Society of Japan (CSJ). The committee just completed the first major project, "Gender Equality Survey in the Science and Engineering Profession," which was commissioned by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan and is summarized in this report. It is the most extensive gender equality survey in the world, in terms of the fields and the number of people surveyed, with responses from almost 20,000 members of academic organizations.

The survey results elucidate the day-to-day activities of people working in the science and engineering fields, such as their working environments and family lives. This survey also reveals the differences in the family lives and working environment among various scientific and technological professions regardless of the field; in particular, differences in the working environment between academic institutions and private companies. The "post-doctoral issue" is becoming a serious problem in the basic science professions and schools, and the survey results clearly point out the issues associated with the limited-term system. Another noteworthy finding is that the rate of female workers' success is drastically increasing in corporations in conjunction with the implementation of the Equal Employment Opportunity Act and the childcare leave system. Furthermore, this trend appears across the board. This confirms our findings from our previous survey of the members of JSAP and JPS in 2001 and suggests their validity in other fields. Meanwhile, the fact that it was the experienced female professionals who feel the gender gap the most acutely indicates that the higher the position, the wider the gender gap becomes. These findings provide valuable basic data for making recommendations about government policies and promoting gender equality in academic organizations on the other hand.

Looking further into the details of the survey results reveal more interesting details. The abnormally long working hours of professionals in the science and engineering fields indicate their commitment to the advancement of science and engineering, but it also means that they do not have free time to enjoy their personal lives or to volunteer for the society since most of their waking hours are spent on the job. Their family lives seem to be sacrificed, too. In coming years, society needs to become more flexible and accommodate more diverse values and career paths. Such a society would open up the possibilities not only to enhance development in science and engineering but also to encourage individuality regardless of gender. It would allow a new way of life for men and women, so they could cooperate with each other and enjoy both work and family life. Balancing work and family life has traditionally been a problem mainly for women. A community where female professionals can live full and successful lives will be a better community for all professionals in the science and engineering fields. I am hopeful that these valuable survey results will help to strengthen each academic organization's commitment to promote gender equality and in turn lead to greater advancement in science and engineering.

After one year of energetic activity by JSAP as the managing group, JPS assumed the management of EPMEWSE. During the transitional period, the Steering Group of EPMEWSE continued the analysis of the survey results, led by Dr. Takashi Kondo. This report is a significant achievement completed with the commendable cooperation and leadership of Dr. Kashiko Kodate as the planning and execution representative and Dr. Takashi Kondo, who made a tremendous contribution in leading the group that analyzed the survey data.

I would like to express my sincere appreciation to the members of each academic organization who participated in this survey project and to the Lifelong Learning Policy Office of MEXT for their support in this project.

Survey Project: "Diverse Visions of Scientists and Engineers in the 21st Century —For the Promotion of Gender Equality—"

Kashiko Kodate (Department of Science, Japan Women's University), Planning and Execution Representative, EPMEWSE

It is now becoming urgent for Japan, which strives to contribute more to the world in academic and scientific fields, to steer its science and engineering culture toward gender equality since the birthrate is dwindling, society is aging, and our values are becoming more and more diverse. The number of women who pursue science and engineering studies is increasing in Japan, but the ratio of female professionals who are active in the science and engineering fields is still far below the international norm. To address this issue, EPMEWSE was established in October 2002, in order to promote a gender-equal environment and networking in the science and engineering fields, and to contribute to society as a whole.

This study was conducted as part of EPMEWSE's activities. It was commissioned by MEXT in 2003 as a research project under the Lifelong Learning Policy Office. Most of the previous surveys focused on female professionals, with the goal of raising their status to the same standard as males'. In contrast, this survey was conducted with cooperation of 39 academic organizations that belong to EPMEWSE, and a uniform set of questions was asked of every member in a science or engineering profession. The purpose of the survey was to understand accurately the current situation, and to make recommendations regarding practical solutions and effective enlightening activities.

This report summarizes the results of this extensive survey, which represent 19,291 responses to 24 questions. Due to the carefully designed survey questions and detailed analysis of the survey results by the Working Group, the findings provide an overview of the current situation of the science and engineering profession. The valuable data from this survey shows there is vast gender gap in the perception of the current social system: while many men think that improving the working environment will lead solve the current problems, many women think that a change in male (and society's) mentality would be necessary. This survey examines the differences, similarities, and gender gaps from various viewpoints, such as the different fields of medicine, biological, science, and engineering, and also between different types of organizations, such as universities versus private companies. It also provides specific recommendations to promote gender equality, as well as numerous data that would be useful for future activities by EPMEWSE. I hope these valuable data will continue to be used effectively and help the activities of EPMEWSE progress rapidly toward gender equality.

I would like to express my gratitude to people at the Lifelong Learning Policy Office of MEXT, who provided us with this opportunity to analyze the current situation of the academic organizations by commissioning this study to us.

This survey was made possible by the enthusiastic efforts of Dr. Yoshikazu Toyama, the first vice chairman of EPMEWSE, and Dr. Takashi Kondo, who worked day and night for a long time as the head of the Analysis Working Group. This report is the result of the efforts of the Survey Preparation and Analysis Working Groups led by Dr. Takashi Kondo, Dr. Kay Domen, Dr. Yoshiko Tsuji, and Dr. Yuki Kunioka, especially of their energetic discussions and thorough evaluations. I would like to express my sincere appreciation to everybody involved in this project.

Lastly, I would like to extend my gratitude to the survey respondents and the administration staff of each academic organization.

Chapter 2

Survey Results

From August 20 through November 10, 2003, we sent questionnaires to the members of the 39 academic societies listed in Appendix A2 and received responses from as many as 19,291 members. We used both electronic (web) and paper formats to distribute the survey. The majority of the members responded in the web format, which accounted for 96.5 %[*1] of the total responses.

The respondents were 83.7 % male and 16.1 % female (0.2 % did not indicate the gender).

2.1 Summary of the Results for Each Question

We asked 24 questions as shown in the Appendix A1. In this report, we will first summarize the results of each question by gender in order to understand the overall trend. We present additional data sorted by various categories when necessary.

2.1.1 Basic Data

Affiliated Academic Society

Figure 2.1 shows the actual numbers of male and female respondents that belong to each academic society and the percentages of female respondents. For detailed numerical data, please see Appendix A3, Table 4.1 (page 58). The highest percentage of female respondents from any society was barely 30 %[*2], suggesting that all of the societies that participated have a very small number of female members. Table 4.1 also shows the percentage (and approximate number) of female members of each organization, if known. In general, the percentage of female respondents exceeded that of female membership in each organization, indicating that female members showed more interest in answering the survey than their male colleagues.

We compiled the survey results by classifying the participating societies into seven academic fields as shown in Appendix A2. The field of life science and biology had the highest percentage of female members, followed by civil engineering, chemical and material engineering, mathematics, electronics and information, physics, and mechanical engineering, in that order.

[*1] Excluding the responses from the Mathematical Society of Japan, which encouraged its members to use the paper form, 98.9 % of the respondents used the web format.

[*2] Excludes the Society of Japanese Women Scientists (SJWS) and the Japanese Women Engineers Forum (JWEF).

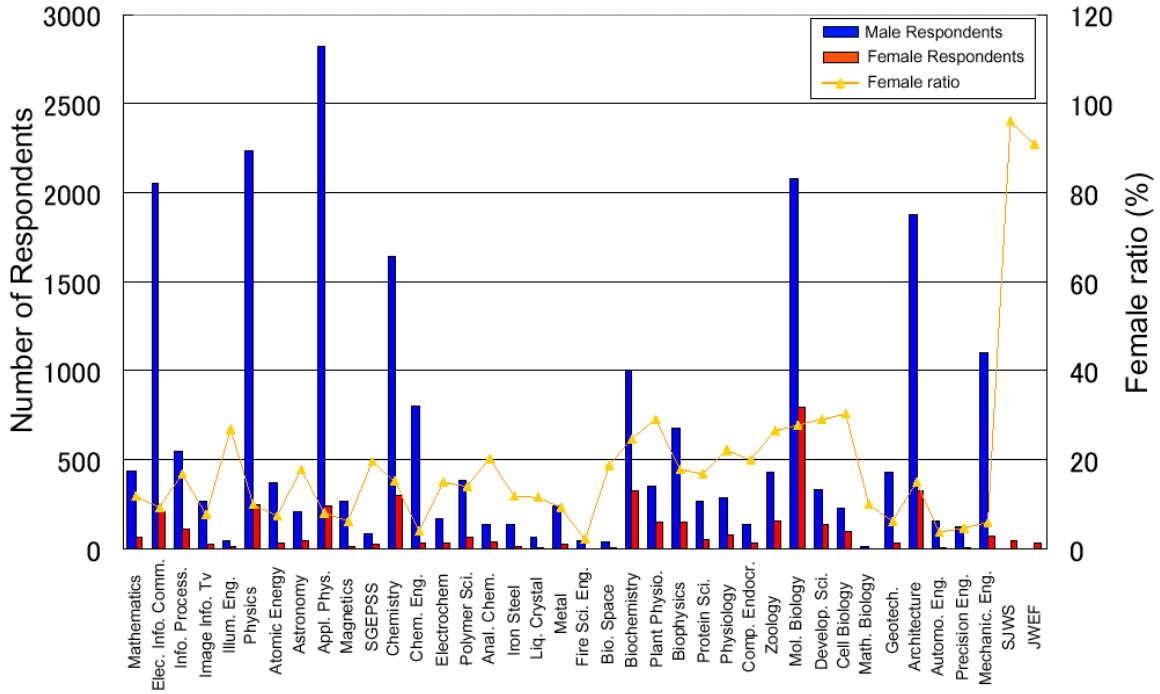

Fig. 2.1 Number of respondents by gender and percentage of female respondents in each society

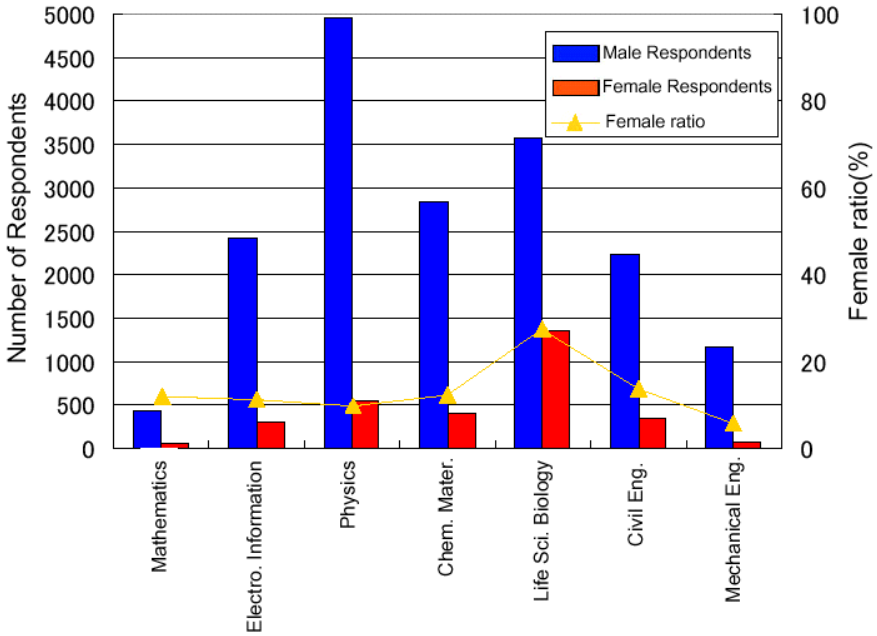

Fig. 2.2 Number of respondents by gender and percentage of female respondents in each academic field

Current Main Affiliation (Type of Organization)

Out of all the respondents, 36.0 % were affiliated with corporations, 47.5 % with universities (national universities, public universities, private universities, and other schools), and 11.0 % were affili-

ated with public research institutions (such as those established by independent administrative institutions). The percentage of female respondents in each type of organization was 9.7 % at corporations, 19.3 % at universities, and 22.7 % at public research institutions. Figure 2.4 shows the breakdown of main affiliations for each academic field. In every field, the percentage of female respondents was lower in corporations. The percentage of female respondents from universities was noticeably high in the mathematics field, as well as in the life science and biology field, although to a lesser extent. Table 4.2 of Appendix A3 (page 59) shows the breakdown of the current main affiliation for members of each academic society.

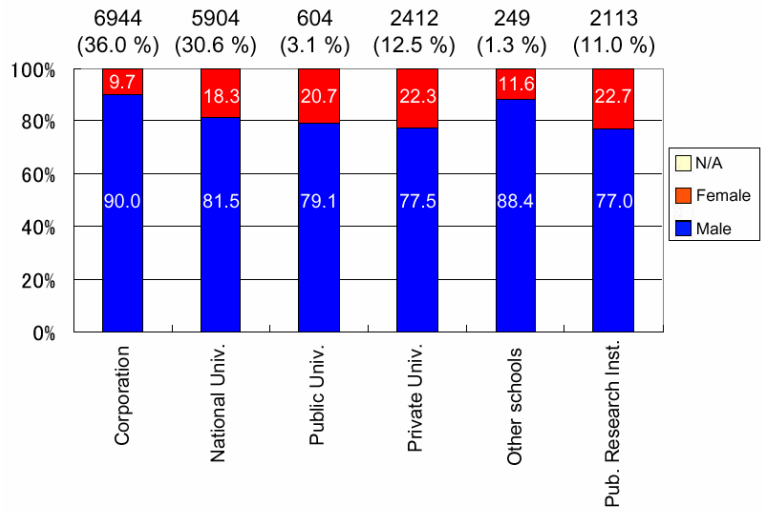

Fig. 2.3 Number of respondents by main affiliation and gender ratio

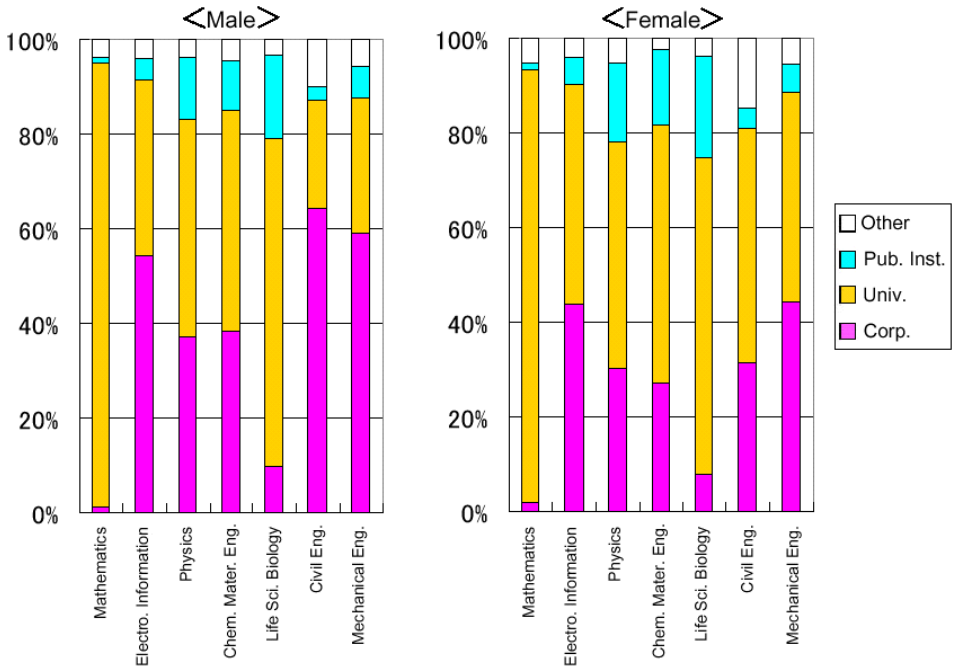

Fig. 2.4 Percentages of main affiliations for each academic field

Age Group

Figure 2.5 shows the number of male and female respondents and the percentage of female respondents for each age group. In this chart, we also plotted the average percentage of women who declared a science major (science, engineering, agriculture, pharmaceutical science, liberal arts with science focus) as college freshman [4] for each age group. The numbers of male respondents were the highest among the 30's and early 40's age groups, whereas the numbers of female respondents were highest among the age groups of the late 20's and early 30's. The percentage of female respondents was higher in younger age groups, while the percentage of female respondents of this survey was higher than the percentage of female science majors as freshmen in every age group. However, that gap narrowed with the older age groups. Assuming that a similar proportion of each age group responded to this survey, this may indicate that women who are in their late 30's and older have dropped out of the science and technology communities for some reason (Note that this survey was sent to current members only, and does not include those who were former members of each organization).[*3]

Figure 2.6 depicts the age group distribution and percentage of female respondents for each academic field. The female ratios were higher in younger age groups across the board, but the age group distribution differed among the various academic fields: there were more, older generation respondents in the fields of mathematics, civil engineering, and mechanical engineering, but the respondents were mostly younger in the field of life science and biology. See Appendix A3 Table 4.3 (page 60) for age distribution of each organization.

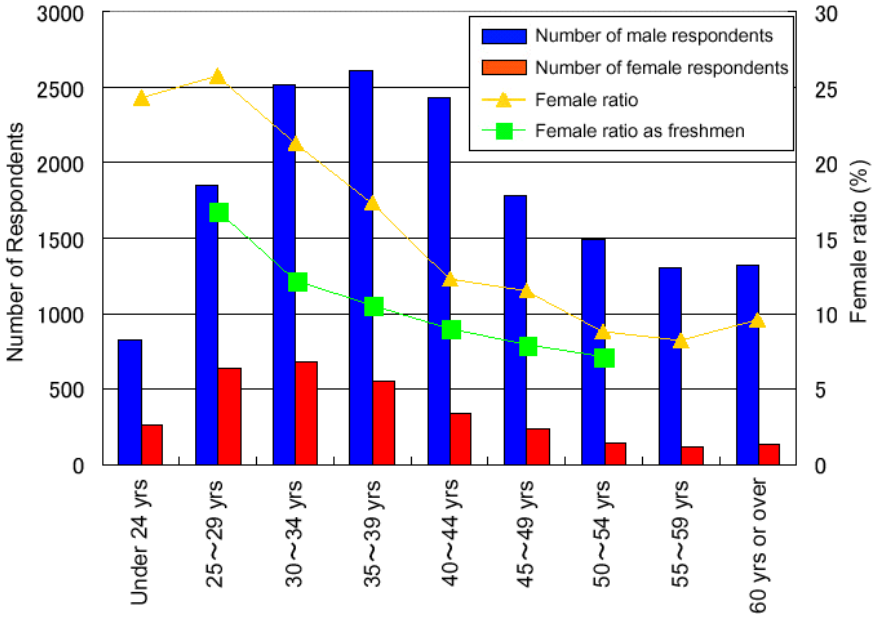

Fig. 2.5 Age distribution of respondents and percentage of female respondents

[*3] Naturally, it is possible that the higher percentage of science majors in older age groups did not choose science or engineering field as their profession to begin with.

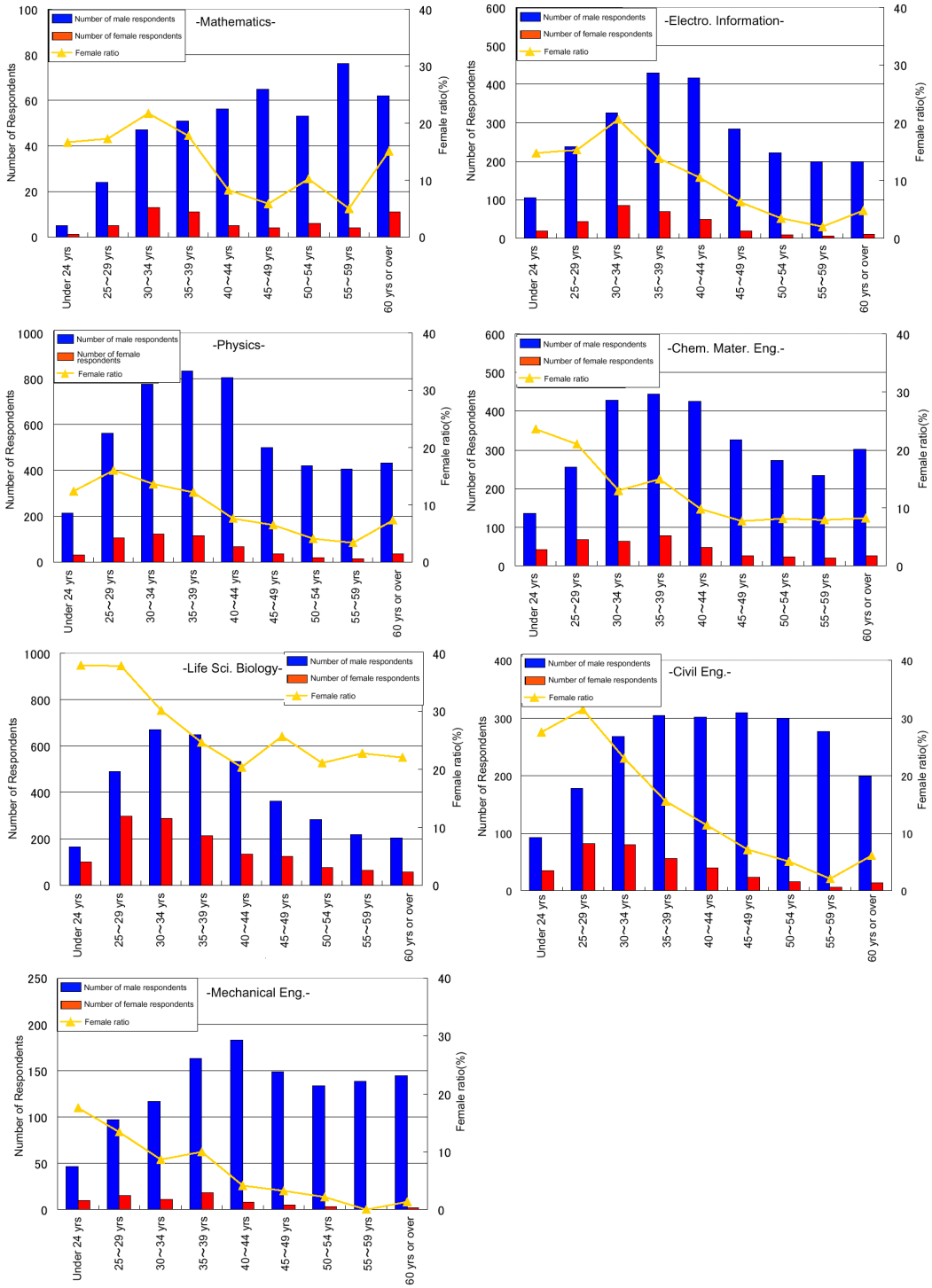

Fig. 2.6 Age distribution of respondents and percentage of female respondents by academic field

Highest Academic Degree

Over 70 % of the respondents had obtained a graduate degree, out of which more than half finished a doctoral course. There was no noticeable gender difference in the academic background of the respondents.

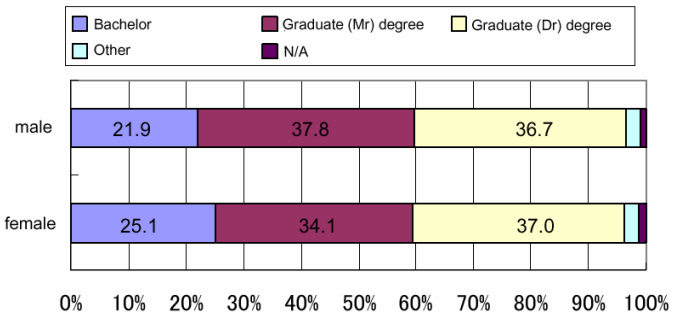

Fig. 2.7 Highest academic degree

Doctoral Degrees

It seems that there was no noticeable gender difference in the percentage of respondents having doctoral degrees. However, more of the female respondents had higher academic degrees in almost every age group, and the gender gap widened with the older age groups (Fig. 2.9). This implies that it was important for women to obtain higher academic degrees in order for them to continue their careers in the science and technology fields.

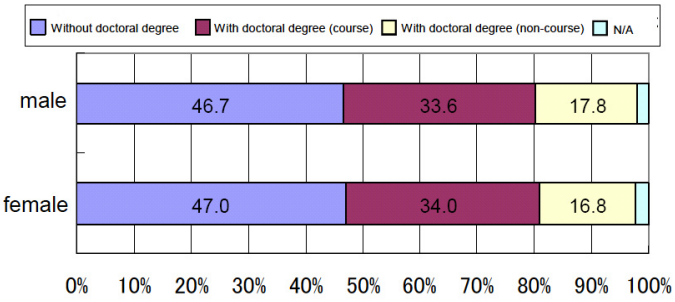

Fig. 2.8 Respondents with doctoral degrees and types of doctoral degrees

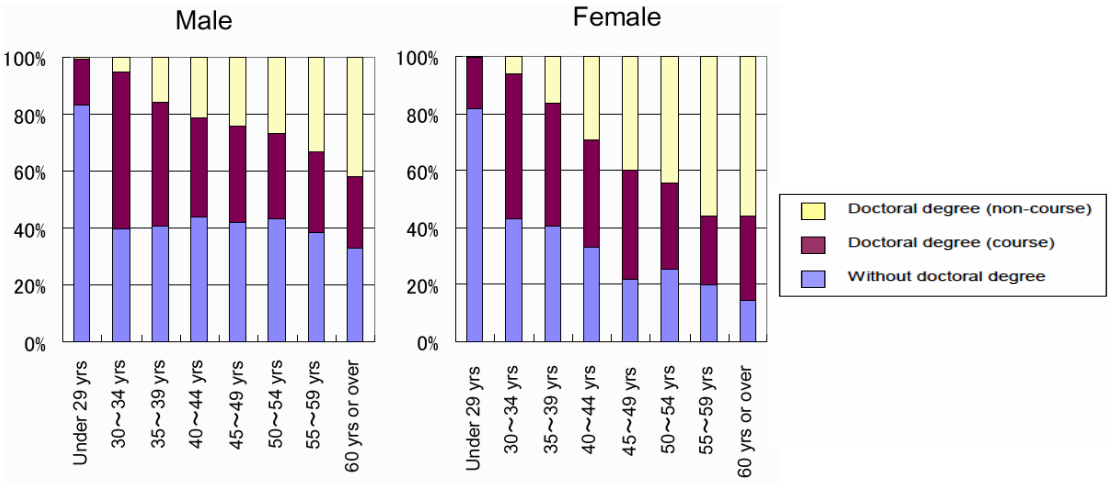

Fig. 2.9 Respondents with doctoral degrees by age group

Marital Status

The gender gap in marital status was very wide with a higher percentage of men that were married.*4 As shown in Fig. 2.11, there was hardly any difference in the younger age groups, but the gender gap widened with the older age groups. In corporations, the percentage of married women was extremely low for the age groups of 50 and over, but there was no gender gap for the age groups of the early 40's and under. This seems to be a direct result of the Equal Employment Act (enacted in 1985) and the Childcare Leave Law (enacted in 1992). In contrast, no such difference was visible in universities and public research institutions, and the gender gap appeared in the age groups of the late 30's and over. The gender gap pertaining to marital status was particularly wide at universities.

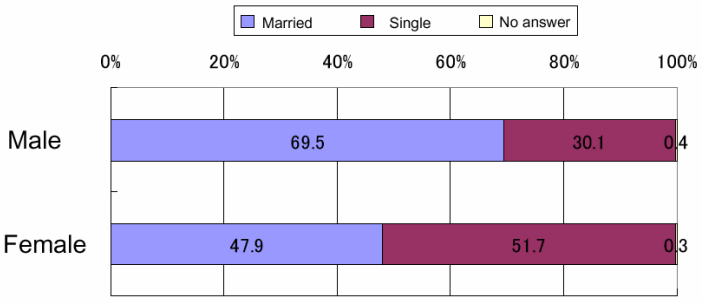

Fig. 2.10 Marital status

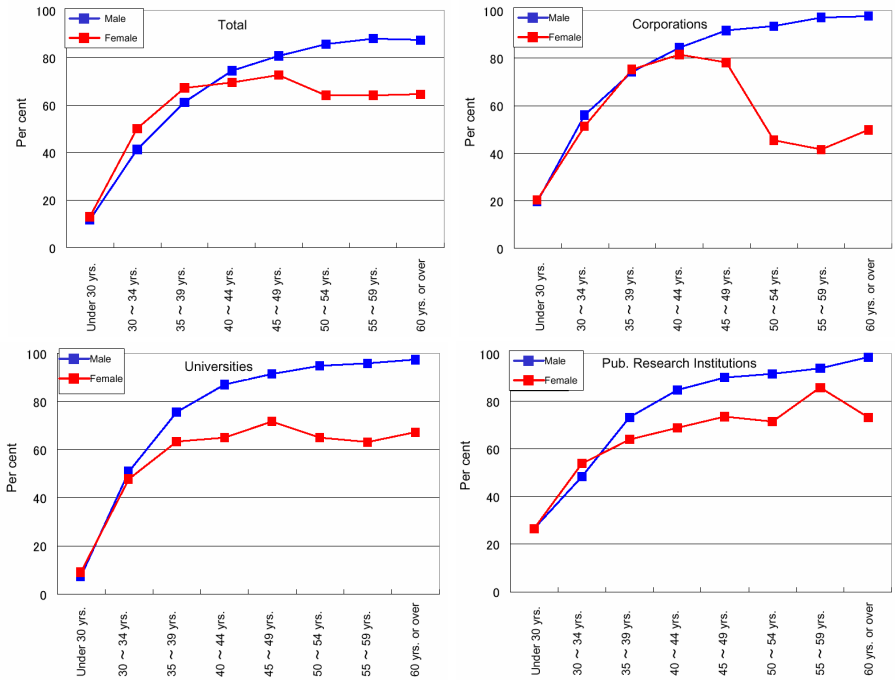

Fig. 2.11 Percentage of married respondents by age group for each type of affiliated organization

*4 According to the research by the Health, Labor and Welfare Ministry (HLWM)[5], the percentages of married working women and men in general were 40.5 % and 62.8 %, respectively. Our survey shows higher percentages of married men and women. However, examining only the manufacturing sector of the research by HLWM found 49.8 % of working women are married, which is closer to the results of this survey.

Number of Children

Male respondents had more children than female respondents. Males' average number of children increased steadily with their age, peaking at two children. However, the average number of children for women peaked at one child in the 40's age group (Fig. 2.13). Comparing the female age group of the 40's, when most women finish having babies, among the organization types they belong to, the average number of children of women working for a corporation was approximately 1.2, close to the national total fertility rate in 2001, which was 1.33. On the contrary, women working for universities and public research institutions averaged less than 1.0. Since the average number of children among respondents who have children was approximately 2 for both men and women, this difference stems entirely from the difference between having children and not having children. Figure 2.14 shows the percentage of respondents with children for each academic field. The gender gap is most noticeable in the biology and life science and civil engineering fields.

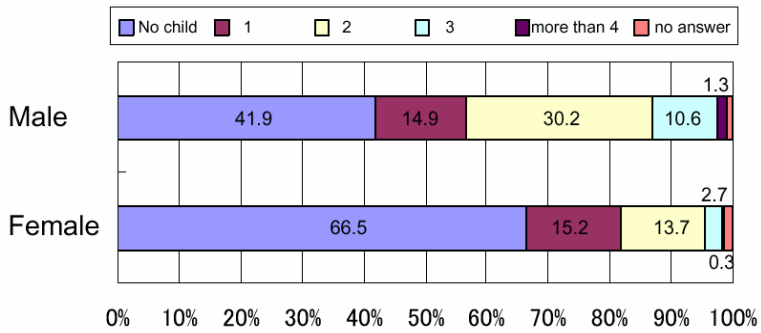

Fig. 2.12 Number of children

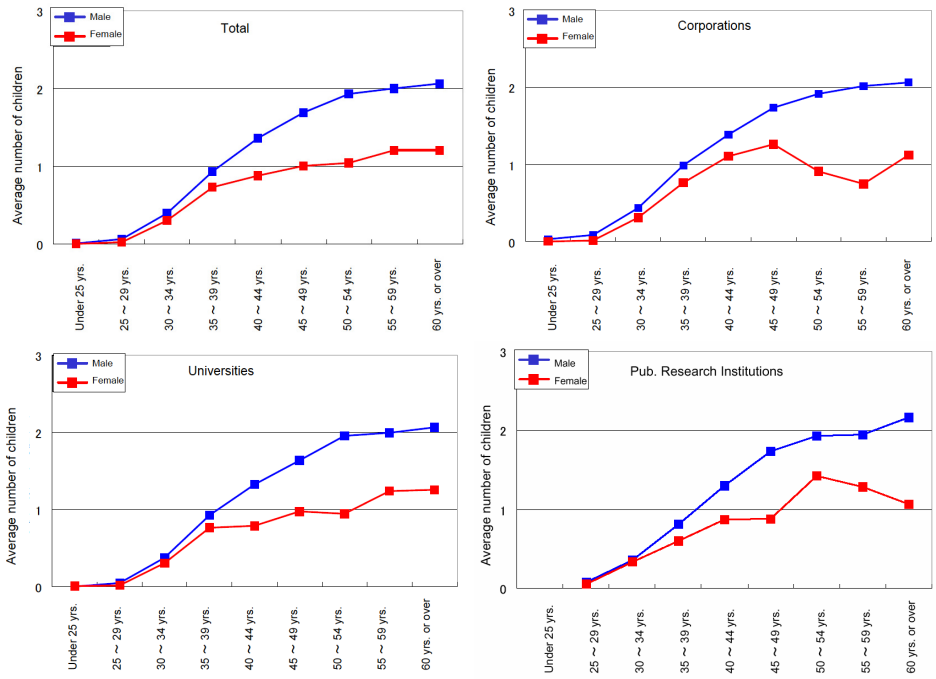

Fig. 2.13 Average number of children by age group for each type of affiliated organization

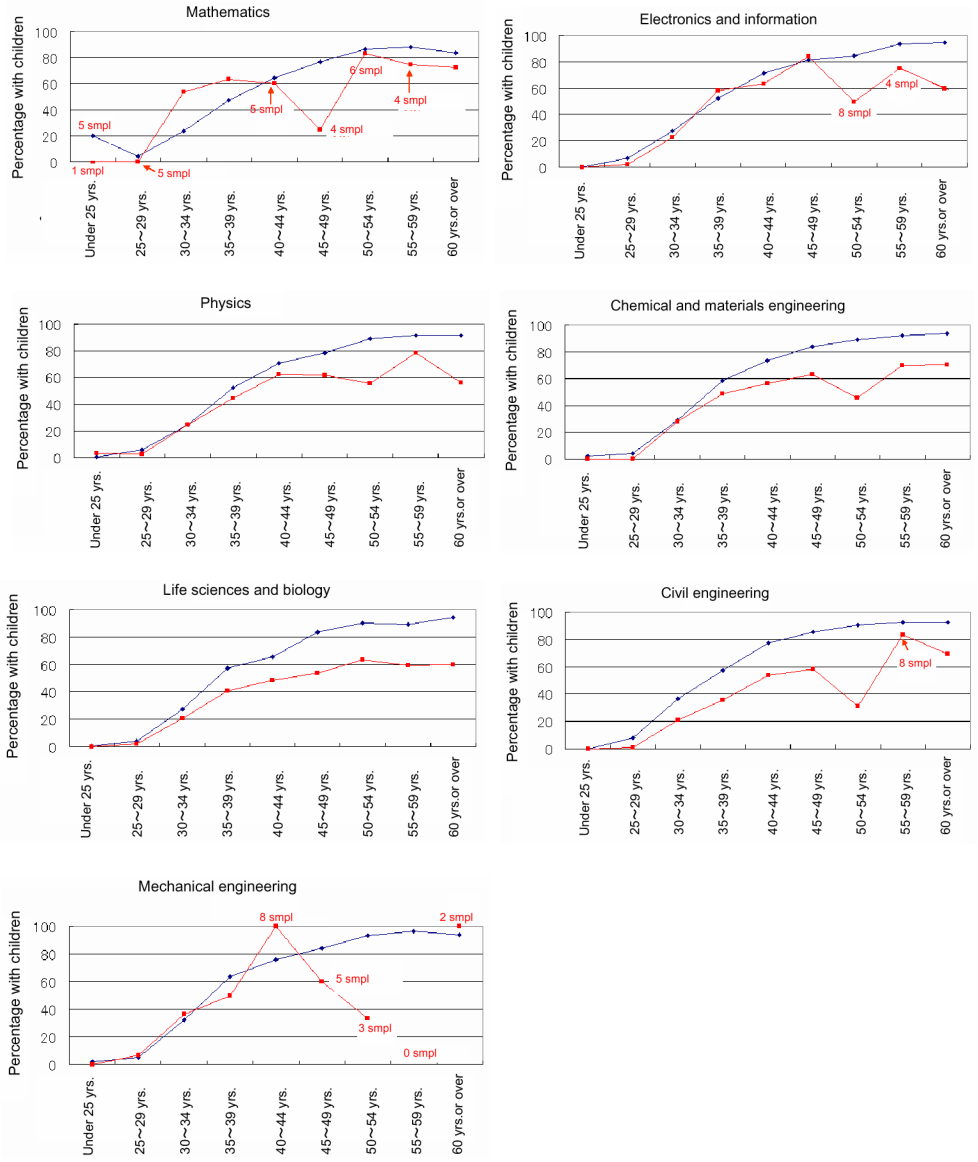

Fig. 2.14 Respondents with children by age group for each academic field

Current Employment Status

Whereas almost 70 % of male respondents were permanent full-time employees, the percentage was only 50 % for female respondents. Ratios of limited-term full-time employees, part-time employees, and students were high with female respondents. The combined percentage of limited-term full-time employees and part-time employees was very high in the younger generations that work for universities and particularly for public research institutions (Fig. 2.16). This, in turn, seemed to lead to the relatively high percentage of part-time and limited-term full-time employees in the life science and biology field (Fig. 2.17). This may reflect the government's policy to invest heavily in life-science research.

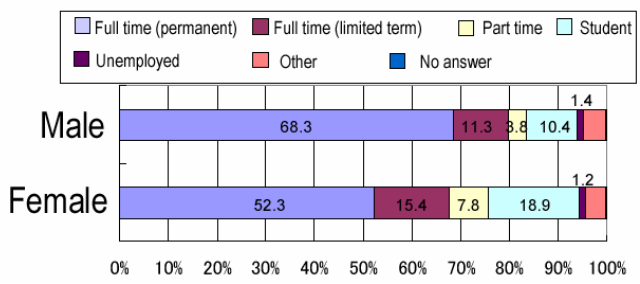

Fig. 2.15 Current employment status

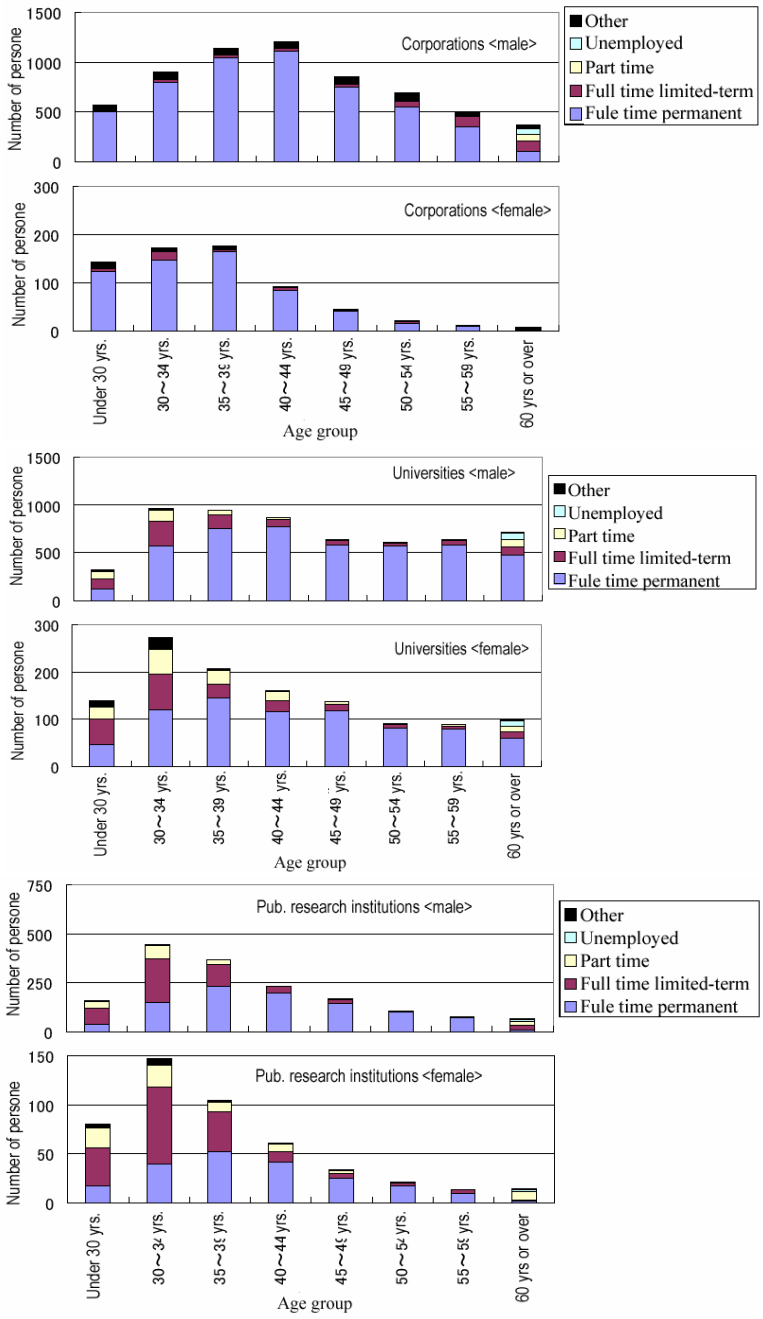

Fig. 2.16 Current employment status by age group for each type of affiliated organization (excluding students)

Fig. 2.17 Employment status (excluding students) by gender for each academic field

Current Position

Figure 2.18 shows the distribution of positions by gender, and Fig. 2.19 shows the gender ratio for each position. It is obvious that the higher the position, the lower the female to male ratio becomes. We will discuss this in detail in the next section.

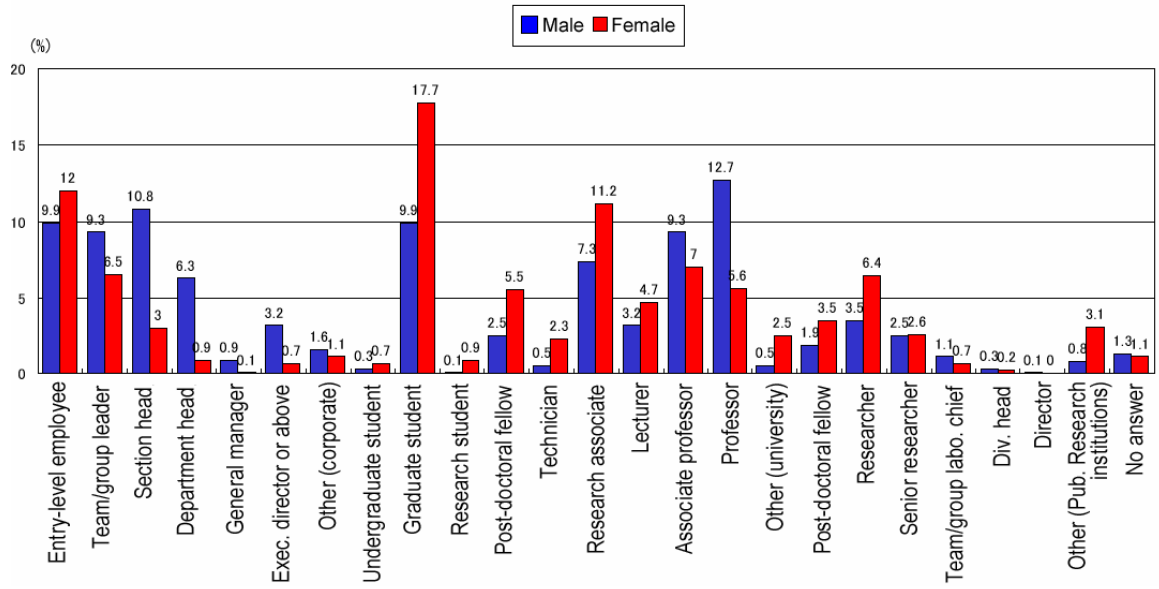

Fig. 2.18 Current position (percentage of all respondents by gender)

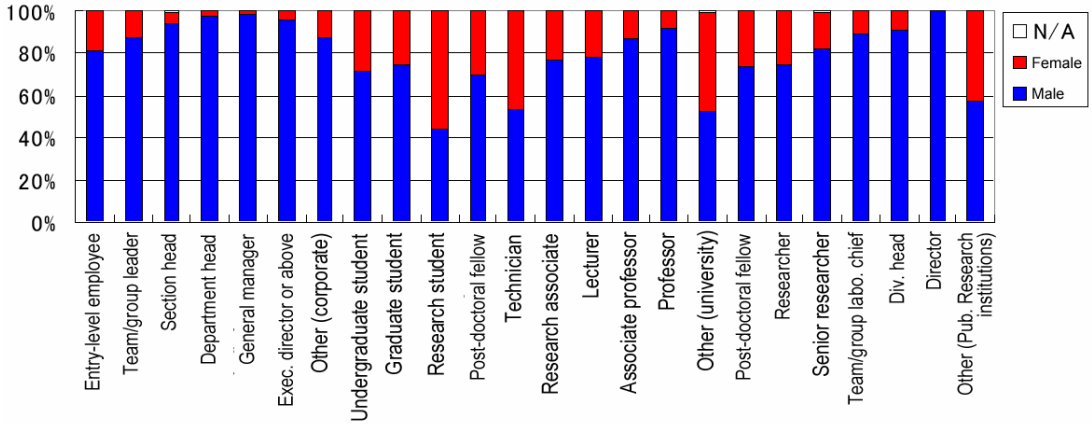

Fig. 2.19 Gender ratio for each position

2.1.2 Working Conditions

Working Hours Spent at the Workplace/Home and Hours Spent on Research and Development

Most respondents, both male and female, answered that they work between 50 to 70 hours a week and approximately 20 % of the respondents were working over 70 hours per week. Long working hours appear typical in the science and engineering fields. Male respondents worked an average of 58 hours, out of which 31 hours were spent on research and development. Female respondents worked an average of 55 hours, out of which 35 hours were spent on research and development.[*5] Male respondents worked longer hours at work on average but female respondents spent a larger percentage of their working time on research and development. When broken down by gender and age group, men's working hours show an upward convex pattern, peaking in the early 30's. In contrast, for women, the pattern is concave with the minimum occurring in the late 30's (Fig. 2.22). For the age groups younger than 50, men work longer hours. The gender difference was greatest, at approximately 7 hours (weekly), for the age group of the late 30's. In contrast, working hours were longer for women in the age groups over 50. As for the time devoted to research and development, there was no significant gender difference for age groups of 30 and younger, but the gender gap tended to widen for age groups of 40 and over, as men spent fewer hours on research and development. This is possibly because the gender gap in the positions (described in the next section) corresponds to a difference in the number of hours spent on management as opposed to research and development.

As for the working hours (including research and development) spent at home, the gender gap was less significant. Both men and women reported working an average of 6 hours at home per week, of which 4 hours were devoted to research and development. Sorted by age group (Fig. 2.25), the older the age group was, the longer hours both men and women worked at home. For the age groups of 40 and over, both women's working hours and research and development hours were 1 hour longer than men's were.

According to the results sorted by academic field (Fig. 2.26), fewer hours at work coincided with longer working hours at home, suggesting that many people take their work home when possible. The time spent at work was by far the greatest in the life science and biology field, probably because

[*5] Dr. Tsugawa's research [1, p. 60] reports similar results: the average weekly working hours for researchers was 59 hours for men and 56 hours for women. A study by the Health, Labor, and Welfare Ministry [6] found that the average monthly working hours in the manufacturing sector was 170.5 hours for men and 145.4 hours for women. It is apparent that the engineers and researchers who responded to our survey work much longer hours than found by these studies.

long working hours are required for experiments, etc. Next to the field of life science and biology, the fields with the longest working hours at work were those having a heavy reliance on experiments, such as the chemical and material engineering, and physics fields.

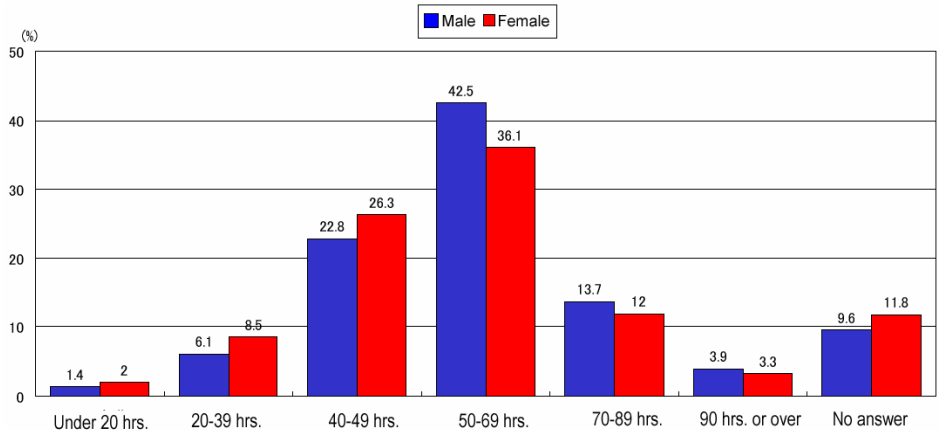

Fig. 2.20 Hours at work

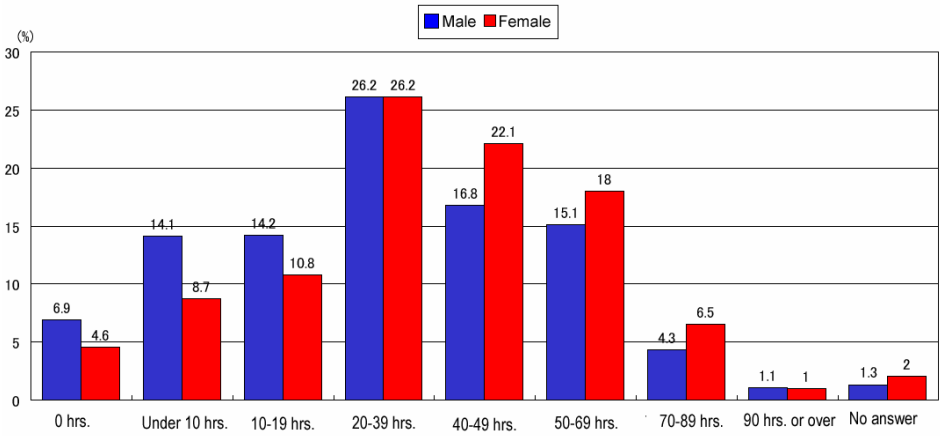

Fig. 2.21 Hours spent on research and development at work (subset of hours at work)

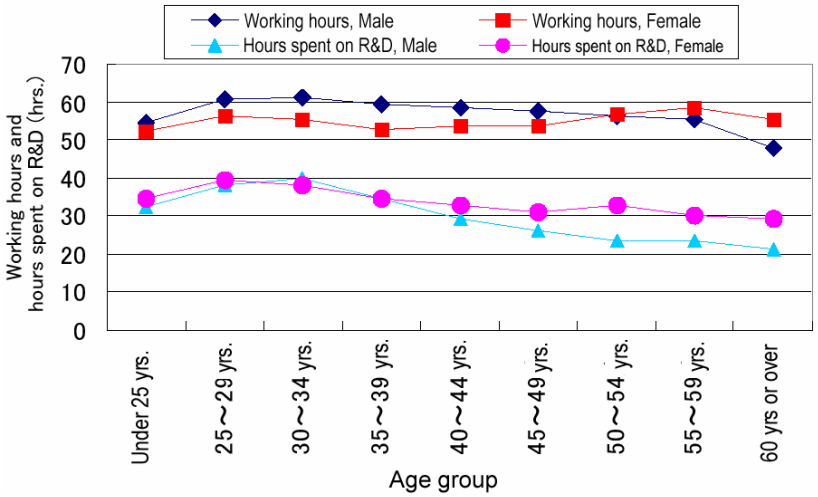

Fig. 2.22 Hours at work and hours spent on research and development by age group

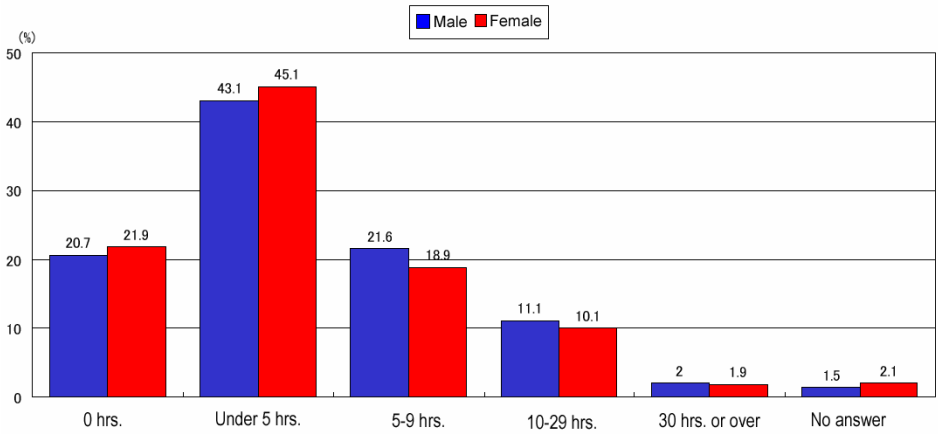

Fig. 2.23 Hours working at home

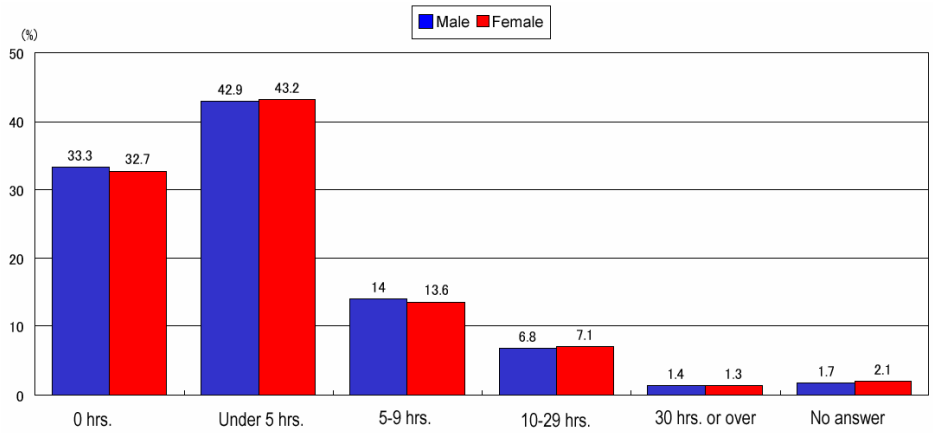

Fig. 2.24 Hours spent on research and development at home (subset of hours working at home)

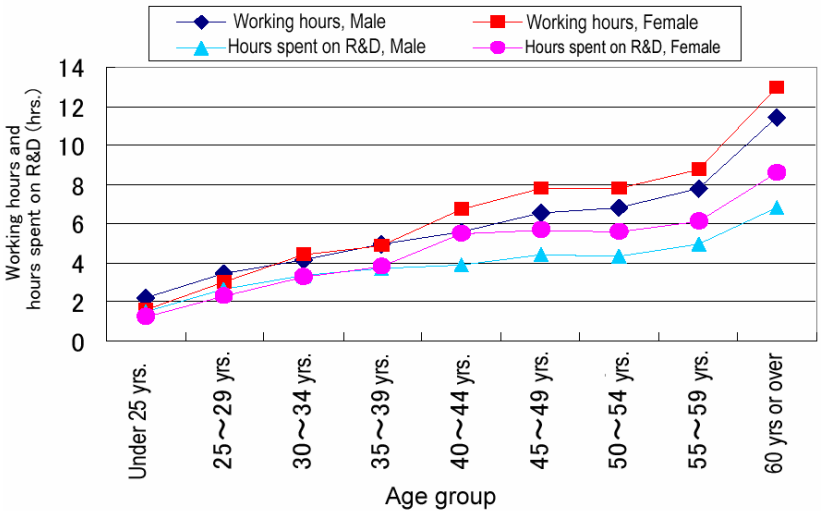

Fig. 2.25 Hours working at home and hours spent on research and development by age group

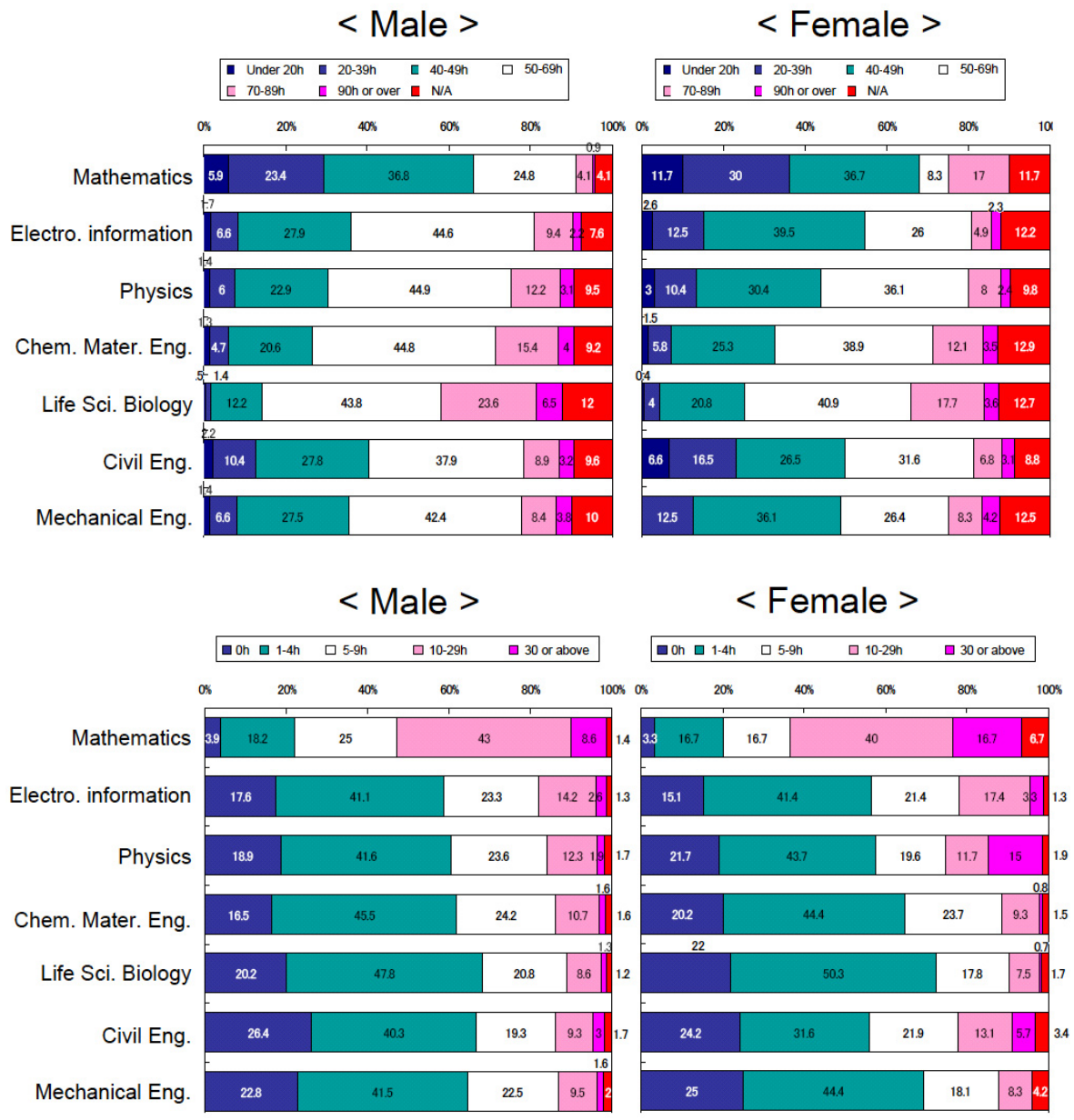

Fig. 2.26 Total working hours at work (top) and home (bottom) by academic field

Number of Subordinates

Men clearly had more subordinates, as almost 60 % of women had no subordinates. We will discuss this in detail in the next section.

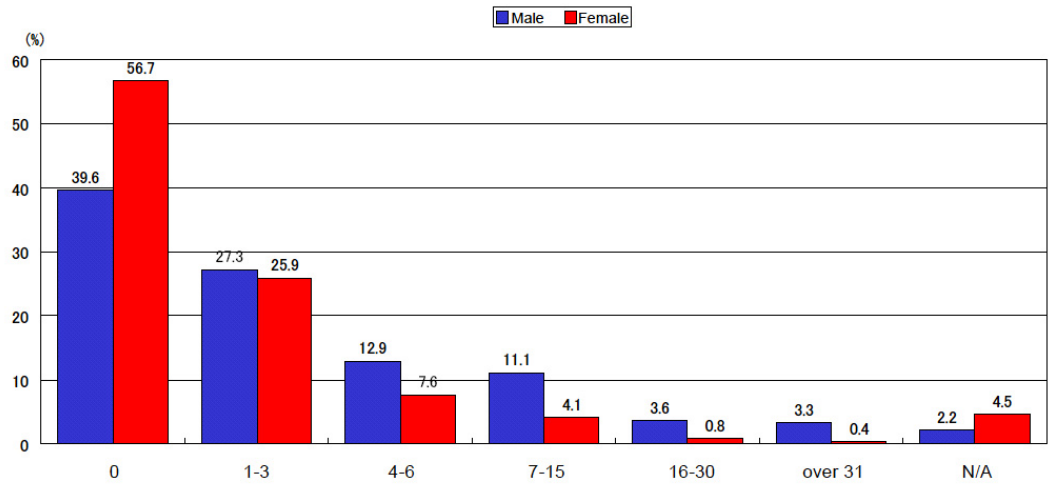

Fig. 2.27 Number of subordinates

Annual Research and Development Budget

It is also obvious that men had larger annual research and development budgets. The difference among academic fields was the most prominent in the answers to this question. As shown in Fig. 2.29, the field of life science and biology received the largest annual budget on average, followed by the fields of chemical and material engineering, and physics, in that order. These findings reflect that research and development budgets are mainly allocated to life sciences and nano-technologies. We will discuss the gender difference in the annual budgets in detail in the next section.

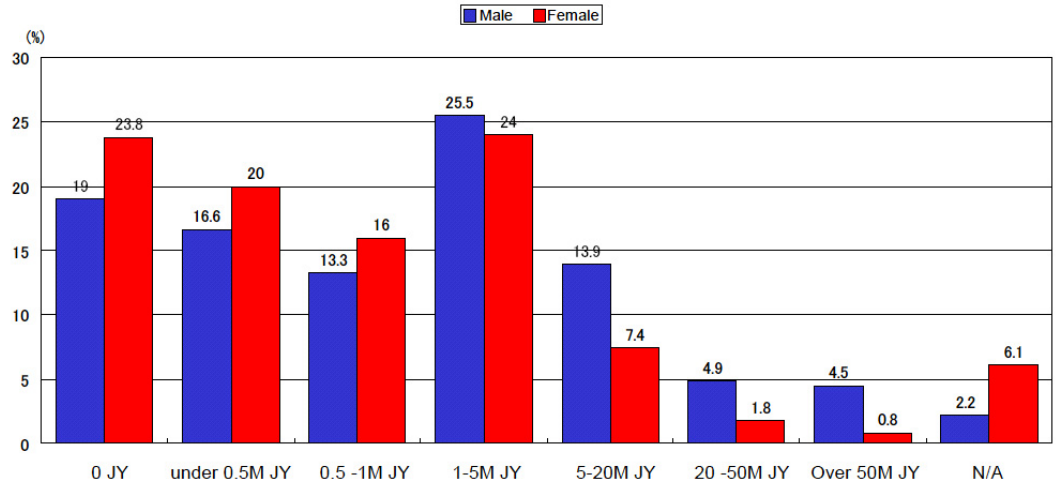

Fig. 2.28 Annual research and development budget

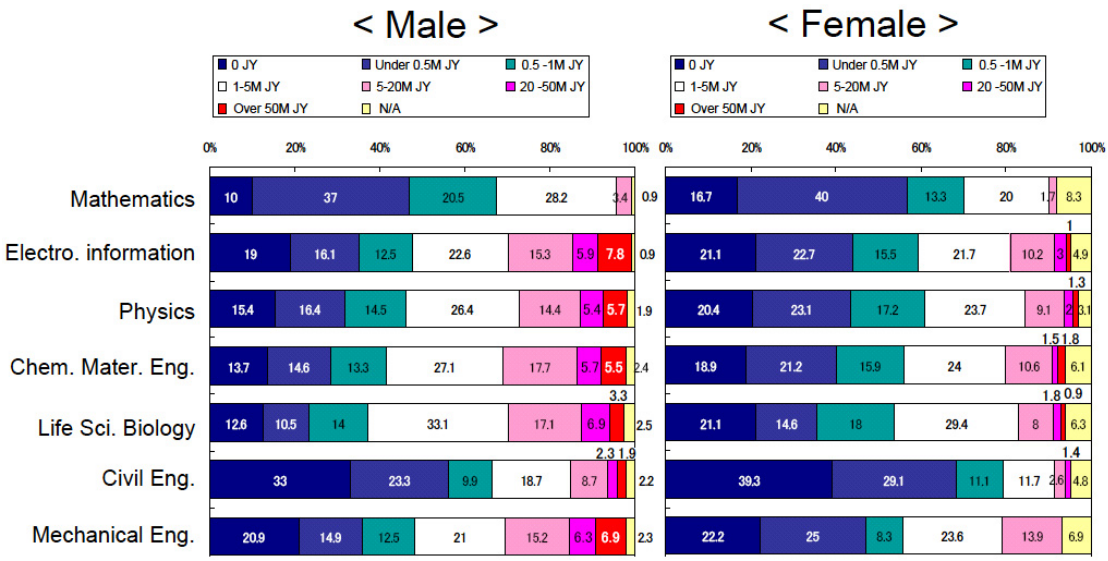

Fig. 2.29 Annual research and development budget—by academic field

Leaving/Changing Jobs

The number of respondents who have stopped working is relatively small, but the percentage of female respondents who have left work exceeded 6 %, over double the rate of male respondents. The percentage of respondents who changed jobs in the past was approximately 20 % for both men and women. As for the subsequent employment status after leaving/changing jobs, 70 % of male respondents have permanent full-time positions, but only 50 % of female respondents have permanent full-time positions, and the percentage of part-time or limited-term full-time positions was high among women who left/changed jobs. Of those that had left/changed jobs previously, the more men and women worked for universities than any other organization, but noticeably fewer women than men were employed by corporations. Almost half of both male and female respondents who have left/changed jobs chose “to further my career” as the reason for leaving/changing jobs (multiple selections were allowed). The other reasons chosen most often were “unhappy with previous workplace” and “concern for the future.” Many more female than male respondents chose “gender discrimination,” “job relocation of my family member,” “marriage,” “childrearing” as the reasons for changing jobs. There was not much difference among the age groups for these female-specific reasons (Fig. 2.34), indicating that the situation has not changed much over time.

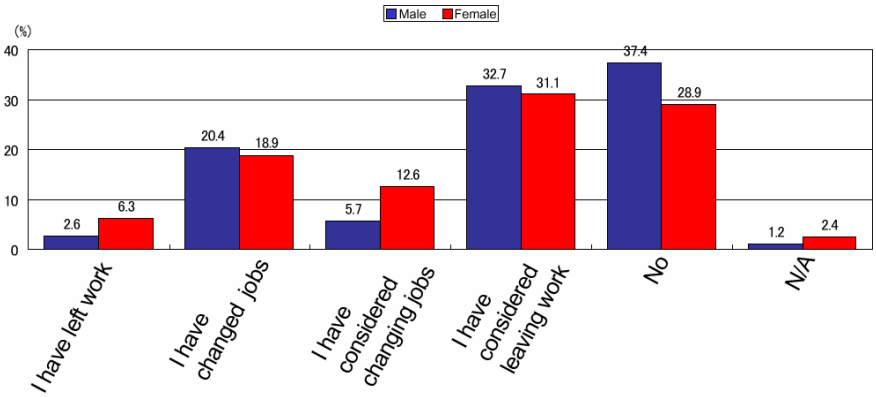

Fig. 2.30 Ever considered leaving/changing work, or actually left/changed work

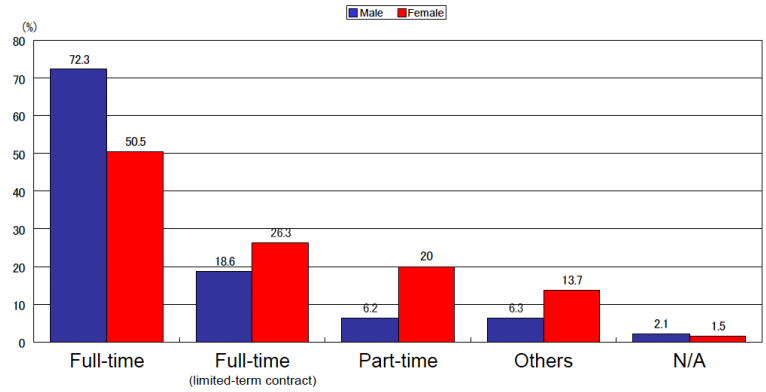

Fig. 2.31 Subsequent employment status after leaving/changing work

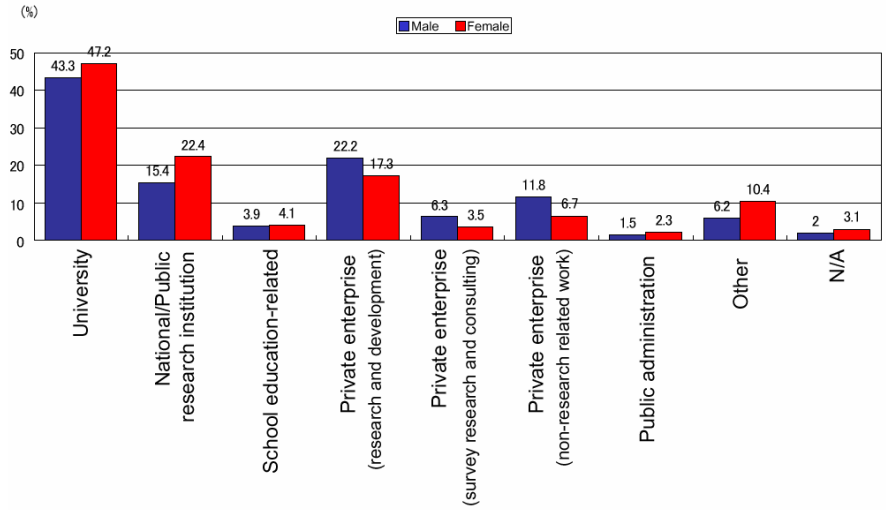

Fig. 2.32 Organization type of employer after leaving/changing work

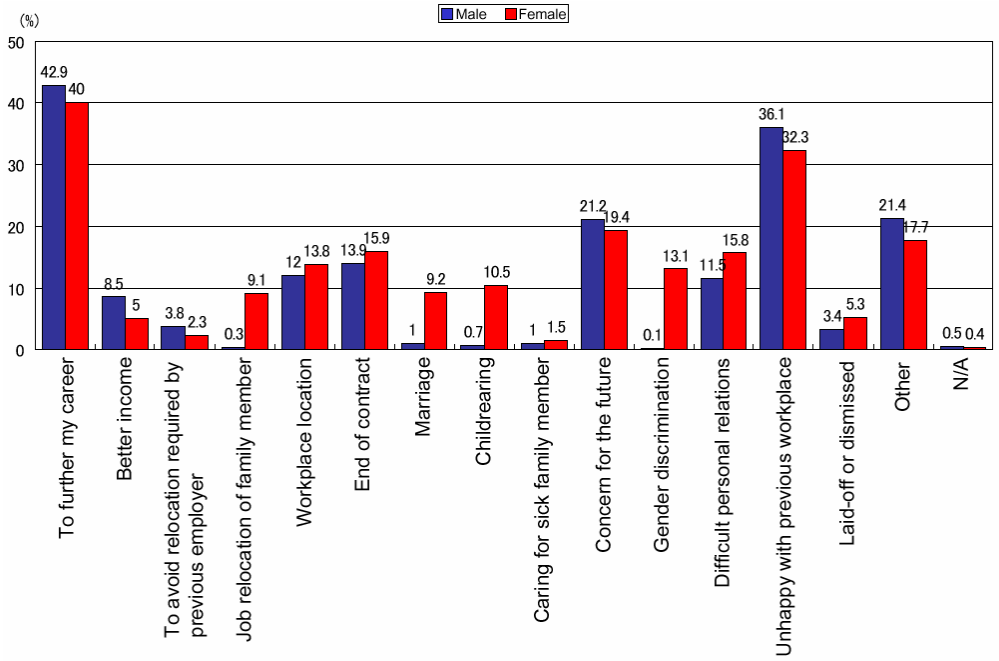

Fig. 2.33 Reasons for leaving/changing work (out of respondents who have left/changed work)

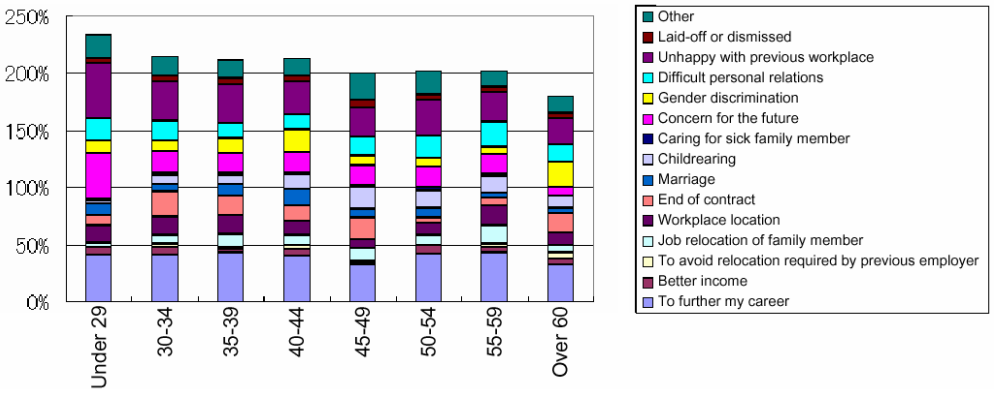

Fig. 2.34 Reasons for leaving/changing work by age group (female only)

2.1.3 Career Awareness

Reasons for Choosing Current Occupation

This is one of the very few questions to which men chose more options than women. For both men and women, the top three reasons were all positive: "because I find this work attractive," "to make full use of my abilities," and "for academic satisfaction/intellectual stimulation." Noticeably more men chose "to benefit society" and "to achieve status/fame" as reasons than women, whereas overwhelmingly more women chose "free of gender discrimination" and "able to balance family and career" as reasons. Figure 2.36 shows the results sorted by each type of organization and position. High percentages of respondents from all three types of organizations (universities, corporations, and public research institutions) chose "because I find this work attractive" and "to make full use of my abilities," but the percentage of respondents who chose "to achieve academic satisfaction/intellectual stimulation" was high with respondents who work for universities and public research institutions but low with those who work for corporations. On the other hand, the percentage of respondents who chose "to benefit society" was high with those who work for corporations and public research institutions but low with those who work for universities. It is also interesting that more people in higher positions chose "to benefit society" and "to make full use of my abilities."

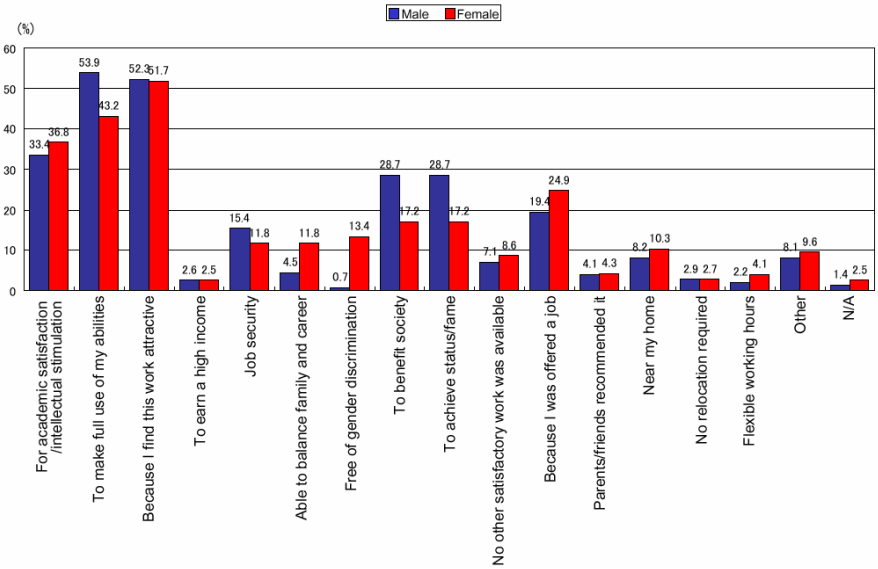

Fig. 2.35 Reasons for choosing the current occupation

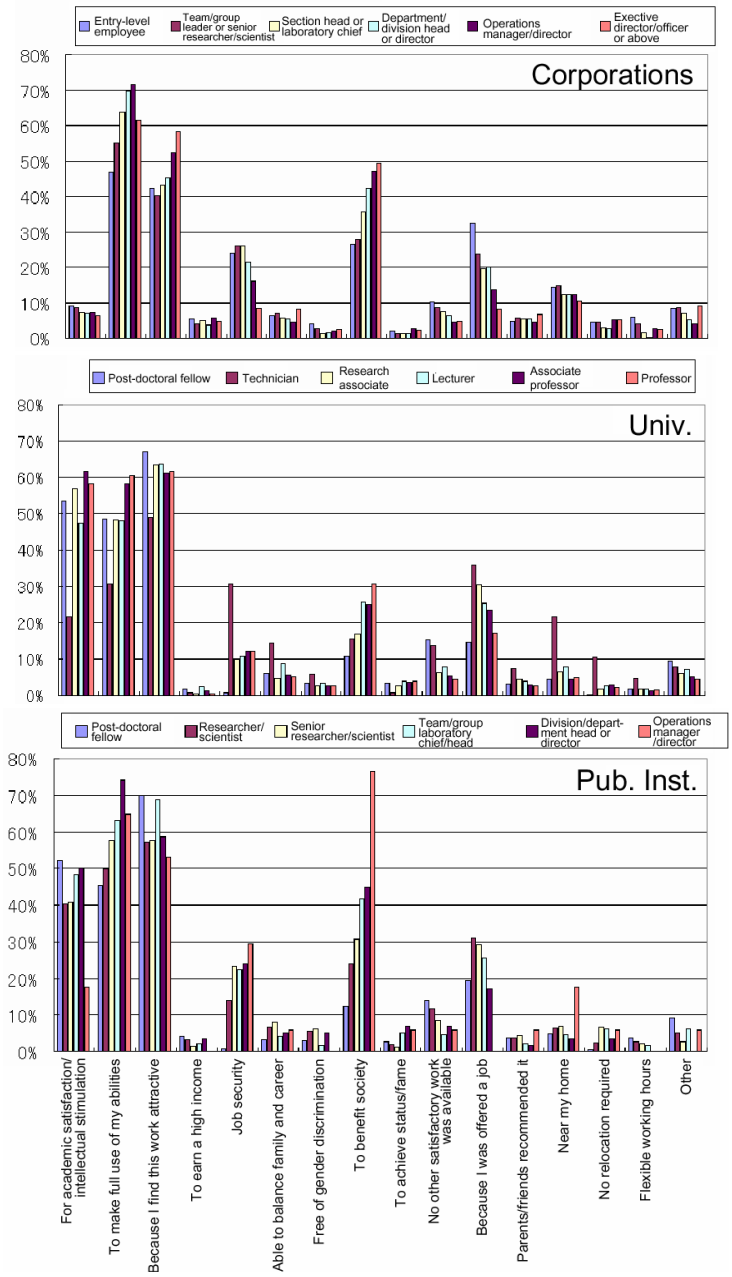

Fig. 2.36 Reasons for choosing the current occupation by current position

Future Goals of Career Paths

For future career paths, 45 % of men and 51 % of women wished to work for universities and 29 % of men and 20 % of women wished to work for corporations. Looking at the results sorted by current affiliation (Fig. 2.38), most of the respondents currently affiliated with universities and public research institutions wished to remain at the same type of institution, and most of the respondents currently affiliated with corporations wished to work for corporations. Figure 2.39 shows responses to the question concerning the likelihood of achieving their position of choice, sorted by gender and age group. Slightly more women than men responded “unlikely,” but still only 20 percent of women chose this answer. It seems that most of the respondents chose their desired position that seemed realistic from

their current situation. Compared to men, more women chose “work in academic research” and fewer women chose “leader of academic research laboratory,” “business management,” “business administration,” and “entrepreneur” as preferred careers. In order to compare these leadership-oriented answers (“leader of academic research laboratory,” “business management,” “business administration,” and “entrepreneur”) with the other answers, we analyzed the responses to this question by gender and academic field in Fig. 2.40. Regardless of the academic field, women were less leadership-oriented than men were. Noticeably more men in the life science and biology field compared to other fields responded “leader of academic research laboratory.” This seems to reflect the fact that this field receives massive funding and researchers with large staffs and abundant funding are successful. However, it is significant that even women in the field of life science and biology did not necessarily seem to desire leadership positions. We also asked which factors (multiple selections were allowed) were important to attain their desired positions. Many of both men and women chose “dedication,” “talent,” “physical strength,” and “personal connections,” but the percentages of women who chose “support from family” and “social support systems” were noticeably higher than those of men. In contrast, the percentage of men who chose “dedication” was noticeably higher than that of women.

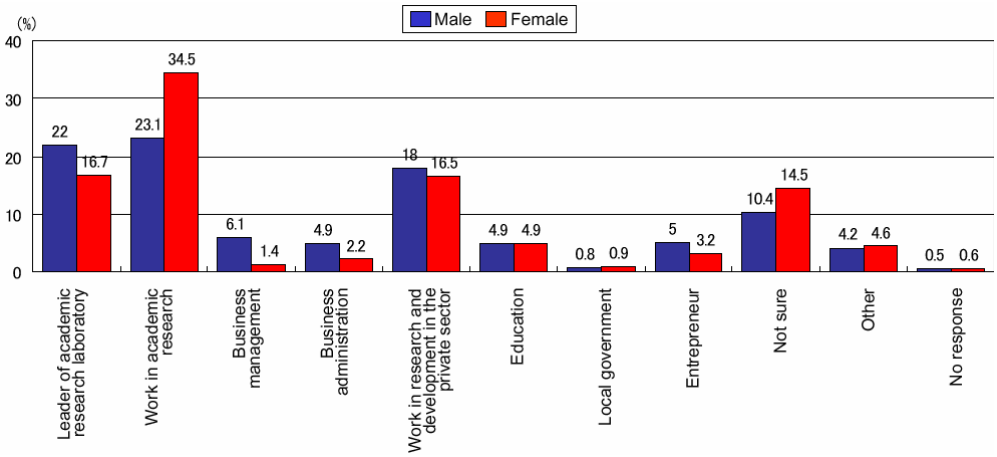

Fig. 2.37 Career goals

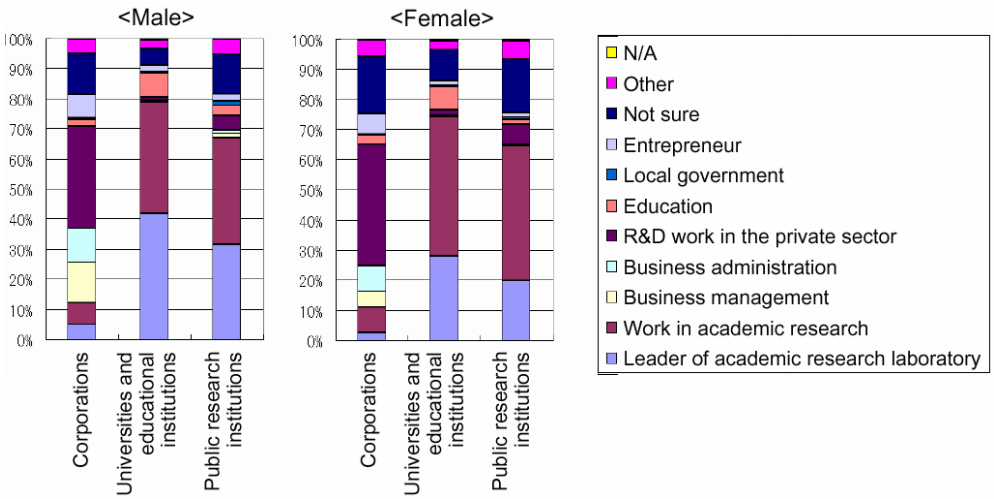

Fig. 2.38 Career goals by current affiliation

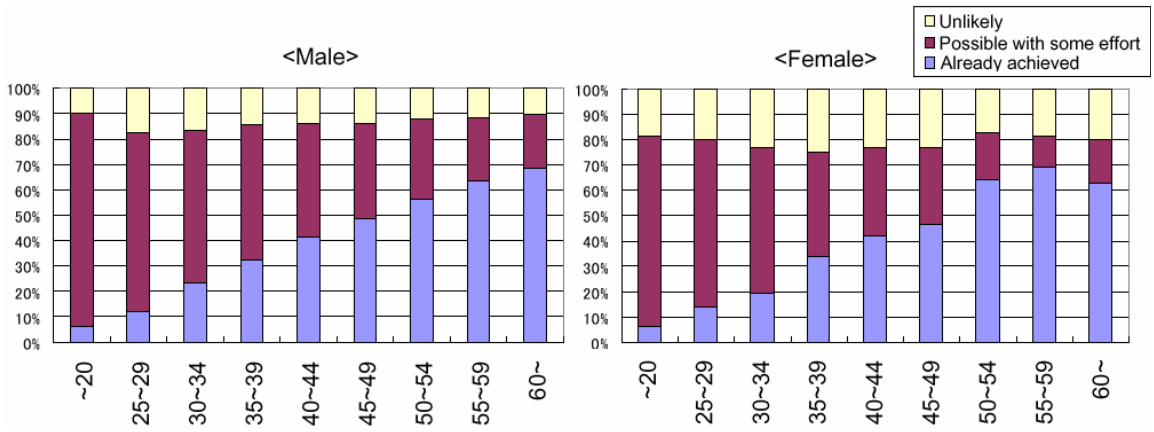

Fig. 2.39 Likelihood of achieving career goal by age group

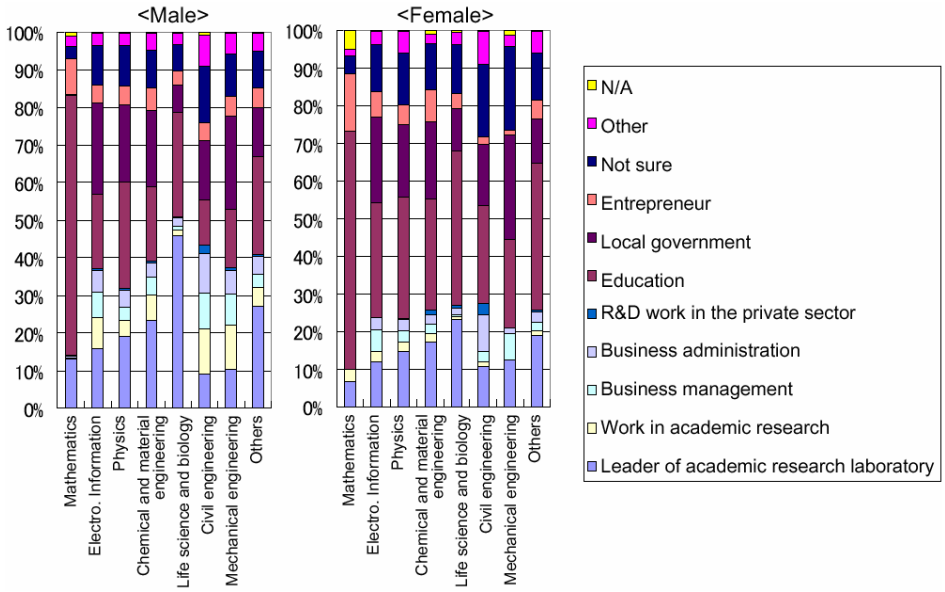

Fig. 2.40 Career goals by academic field

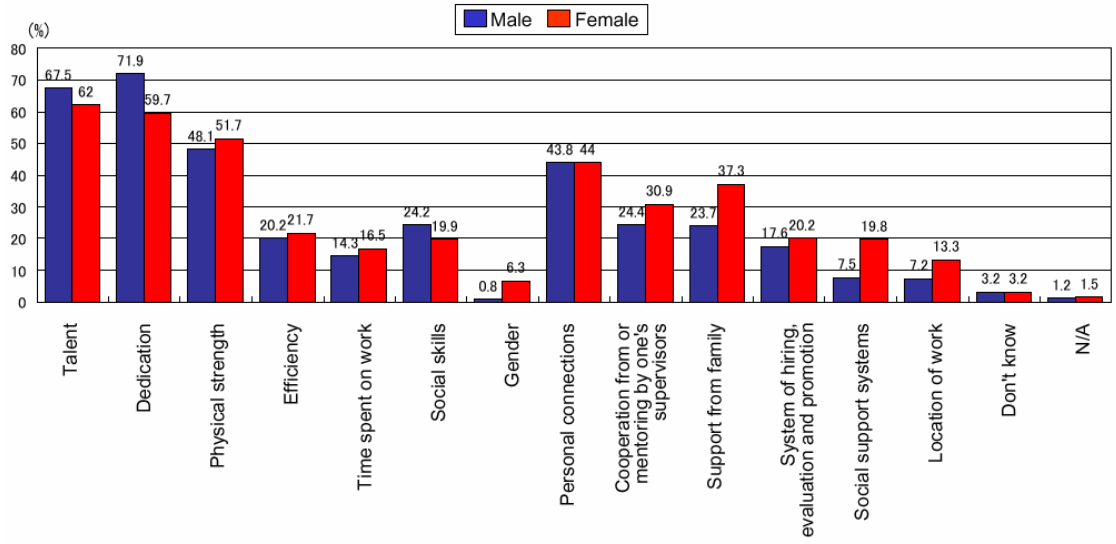

Fig. 2.41 Important factors to attain the desired position

Limited Term Contracts

Many of both men and women thought that limited-term contracts "should be introduced cautiously," but women tended to be more cautious than men. Regardless of gender, while many thought limited-term contracts would "stimulate/contribute to research development within the organization," quite a few also expressed negative views, such as that limited-term contracts would "make it difficult to find next position," "make life planning difficult," or to make it difficult to "tackle/commit to large projects." Comparing men and women, slightly more women chose negative views. However, 15 % of female respondents felt the limited-term contracts would make it "easy to return to work after childrearing break, and the like." The fact that many women also chose "age restrictions" as a negative factor implies that quite a few women are trying to return to work through limited-term contracts after leaving work due to family matters.

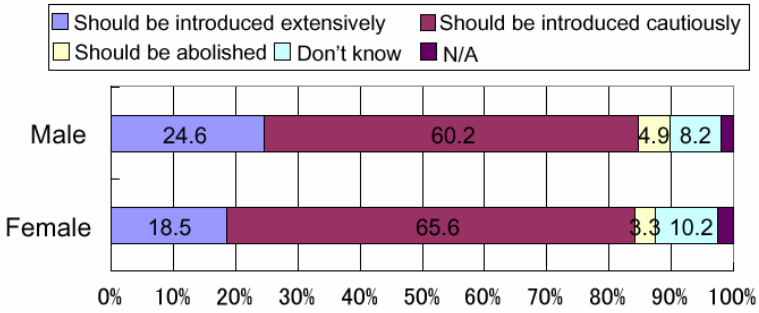

Fig. 2.42 Opinion of limited-term contracts (including post-doctoral positions)

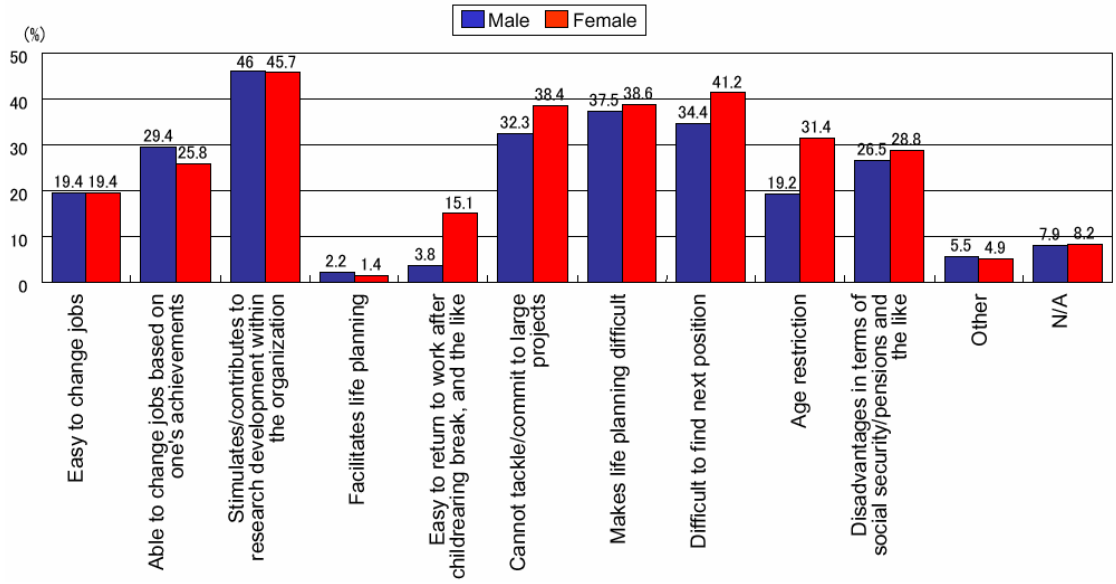

Fig. 2.43 Reasons for opinion of limited-term contracts

Environment and Opportunities Necessary to Further Research and Development

The differences between men and women were the least apparent in their answers to this question, indicating that there is little gender difference in professional awareness and commitment to work in the fields of science and technology. Regardless of gender, the highest percentages of respondents chose "research and development funds," "facilities for research and development," and "time for research and development," followed by "long-term project environment" and "freedom in research and development" as necessary to further research and development. A relatively higher percentage of female respondents chose "understanding/cooperation of supervisors," "presence of collaborating researchers," and "guidance by advisors" as necessary, compared to male respondents.

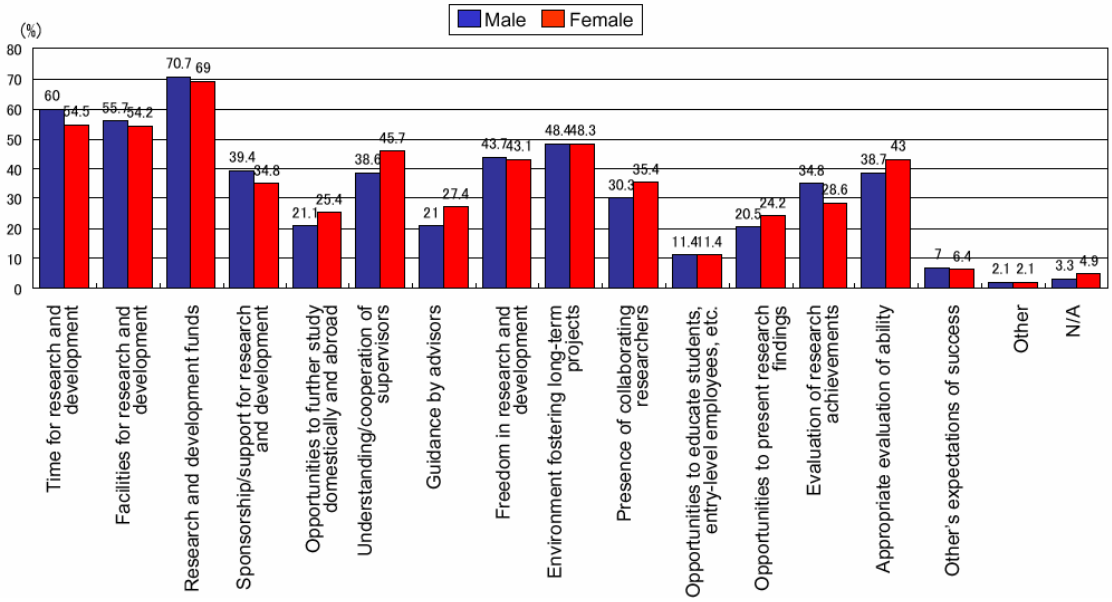

Fig. 2.44 Environment and opportunities necessary to further research and development

2.1.4 Balancing Work and Family Life

Childcare Leave

Most of the male respondents depended on their spouses for childcare, but female respondents were taking charge of childcare, using childcare leave and day-care systems. Considering that half of female researchers and engineers are married to men in the same profession [1, p. 64], it seems the perception that "family affairs and childcare are the woman's job" still persists even in the science and technology professions. Approximately 40 % of women had taken childcare leave, but less than 2 % of men had, and furthermore, the average length of men's leaves was much shorter than women's was. As for the effects of taking the childcare leave (multiple selections were allowed), approximately 70 % of both men and women returned to the same position, but almost 30 % of women responded that their "pay increases and promotions were delayed" as a result.[*6] We will discuss childcare leave in greater detail in the next section.

[*6] Although very few people responded "I lost my job" or "I left my job" to this question, special attention must be paid in this aspect, because this survey does not cover people who actually lost/left work, since these people usually leave the academic societies as well.

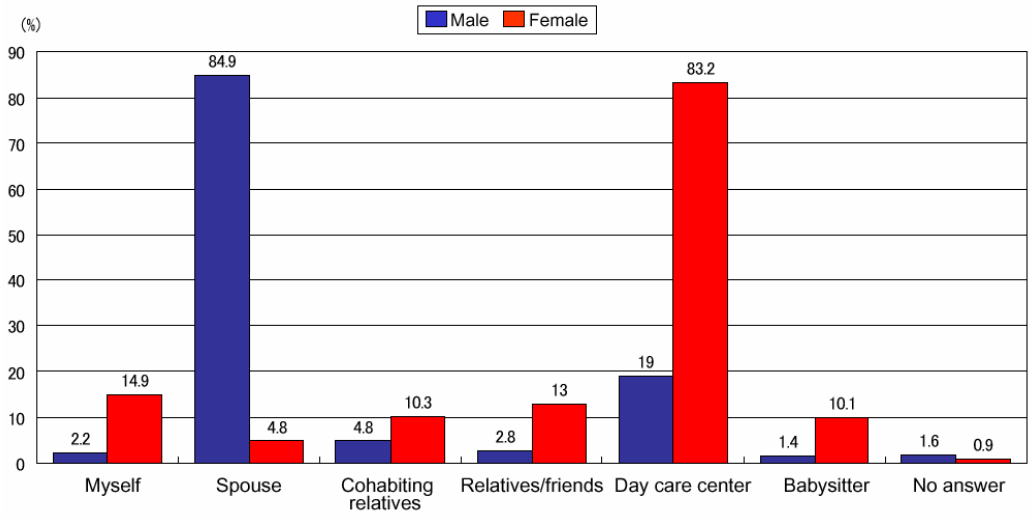

Fig. 2.45 Main caregiver for pre-school age children during working hours

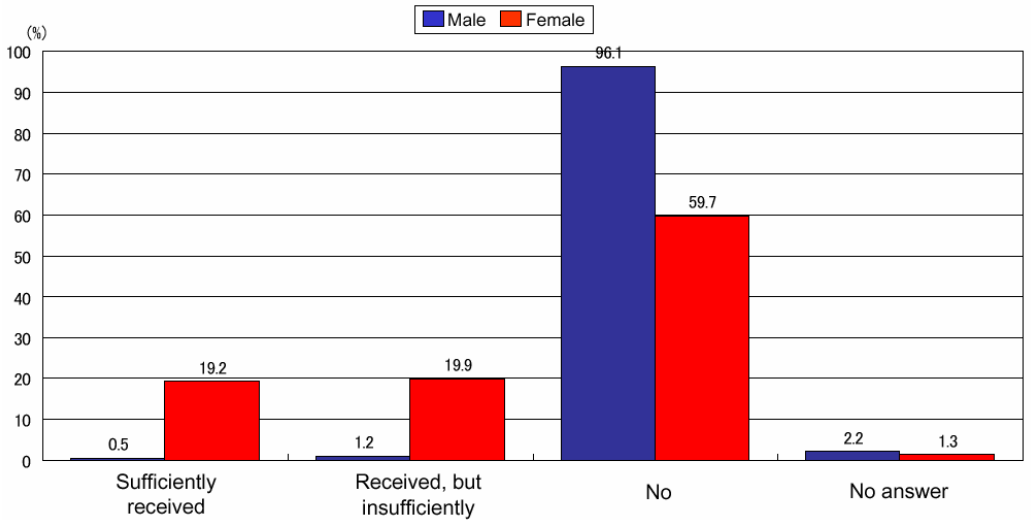

Fig. 2.46 Percentage of respondents who have taken childcare leave

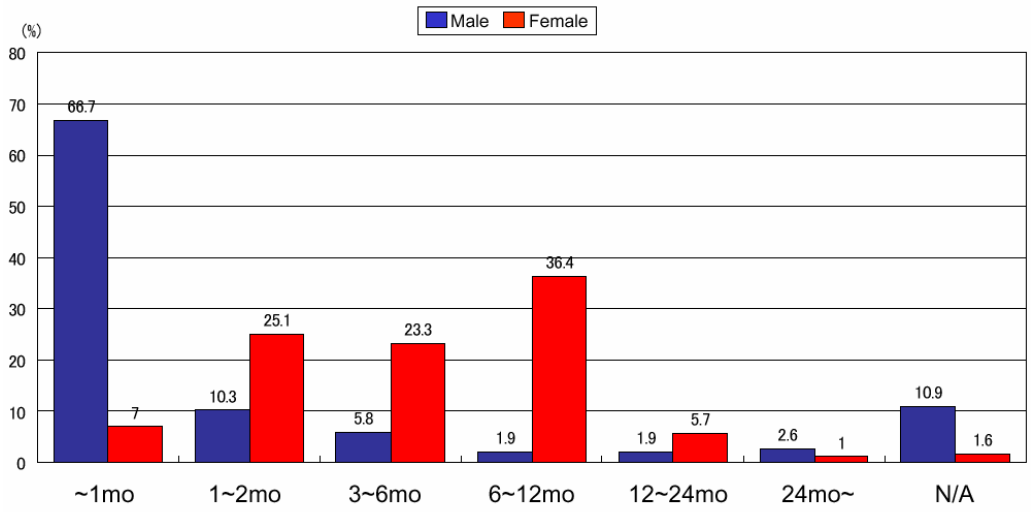

Fig. 2.47 Duration of childcare leaves

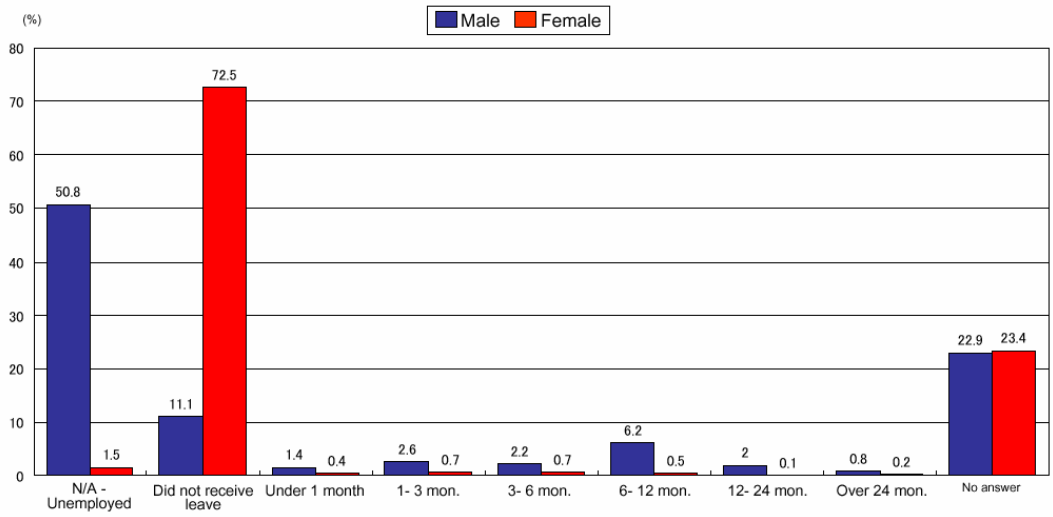

Fig. 2.48 Percentage of respondents whose spouses have taken childcare leave

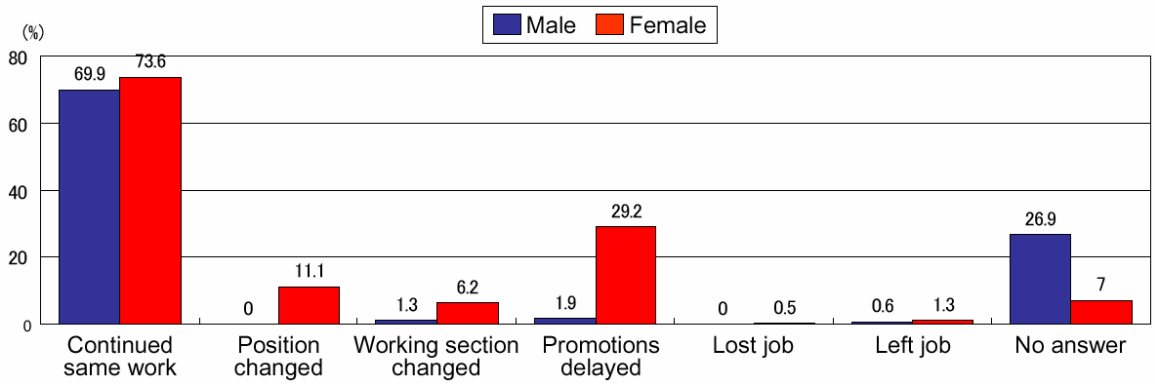

Fig. 2.49 Effects of taking childcare leave

Evaluation of Those Who Take Childcare/Family-care Leaves

To the question “how should the organization handle those who take leave to care for children or sick family members,” slightly more men than women responded “strict, performance-based evaluations,” and slightly more women than men responded “deal with each case on an individual basis according to the person’s ability and track record,” but overall, the difference between men and women was small. The most frequent answer was “deal with each case on an individual basis according to the person’s ability and track record,” which approximately 50 % of the respondents chose.

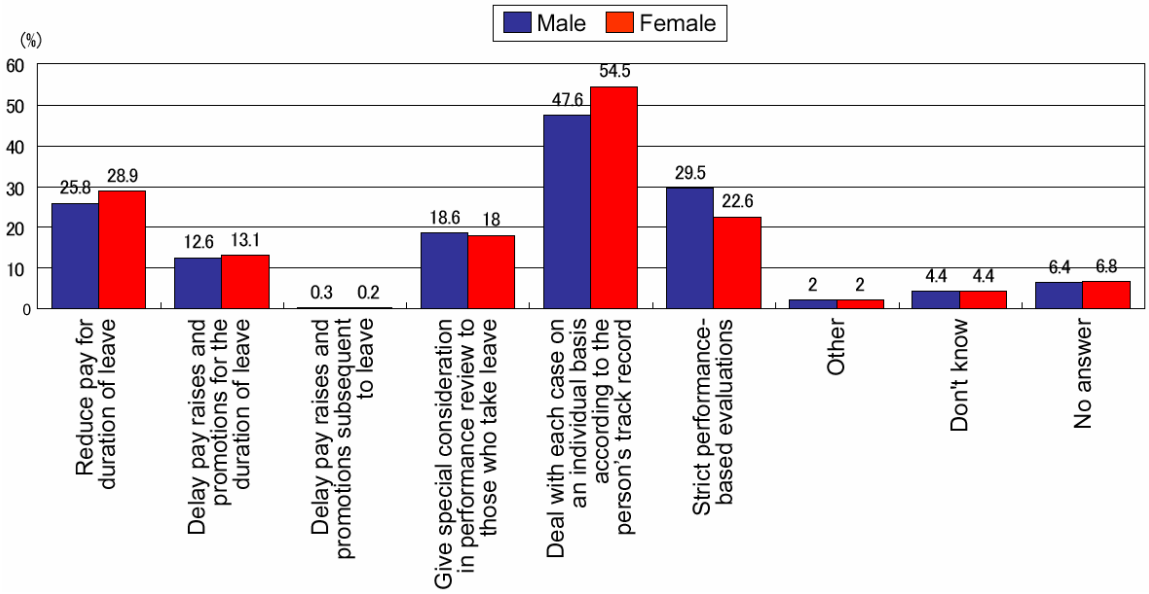

Fig. 2.50 Evaluation of those who take childcare/family-care leaves

Balancing Career and Family Lives

To the question, "what do you think is necessary to maintain a balance between work and childcare, caring for sick family members, and/or time for oneself," most of both male and female respondents chose "supportive working atmosphere," "more flexible working hours," and "diverse working styles." Notably, among men "change in work-centered mindset" was chosen frequently. Both men and women were longing for an improvement of the leave system as indicated by the large percentage of respondents who chose "diversified leave system" and "system to allow work at home during leave." Women also urged more social support for childcare and family-care, as shown by answers such as "more daycare services," "less distance between workplace and home," "financial support for childcare and elder care," and "day care services for children who are ill." In particular, gender gaps were noticeable for the answers "more daycare services" and "day care services for children who are ill." A gender gap was also apparent for the answer, "change in mindset regarding gender roles."

Figure 2.52 shows the results categorized by "childless," "with children (elementary school age and younger)," "with children (middle-school age and over)," in order to compare the differences between having children and no children, and among various age groups. The number of women with children who chose "less distance between workplace and home," "home help," "day care services for children who are ill," "more flexible working hours" was particularly high, implying that the burden of household chores and childcare weighs heavily on them. The fact that the percentages of the respondents who chose these answers were similar regardless of the children's age indicates that these problems still persist. The largest difference among generations was seen in the answer, "supportive working atmosphere," chosen more often by respondents from the younger generation. This suggests that a working atmosphere that supports the balance between work and family life is becoming more important, as the social systems to support working parents improve.

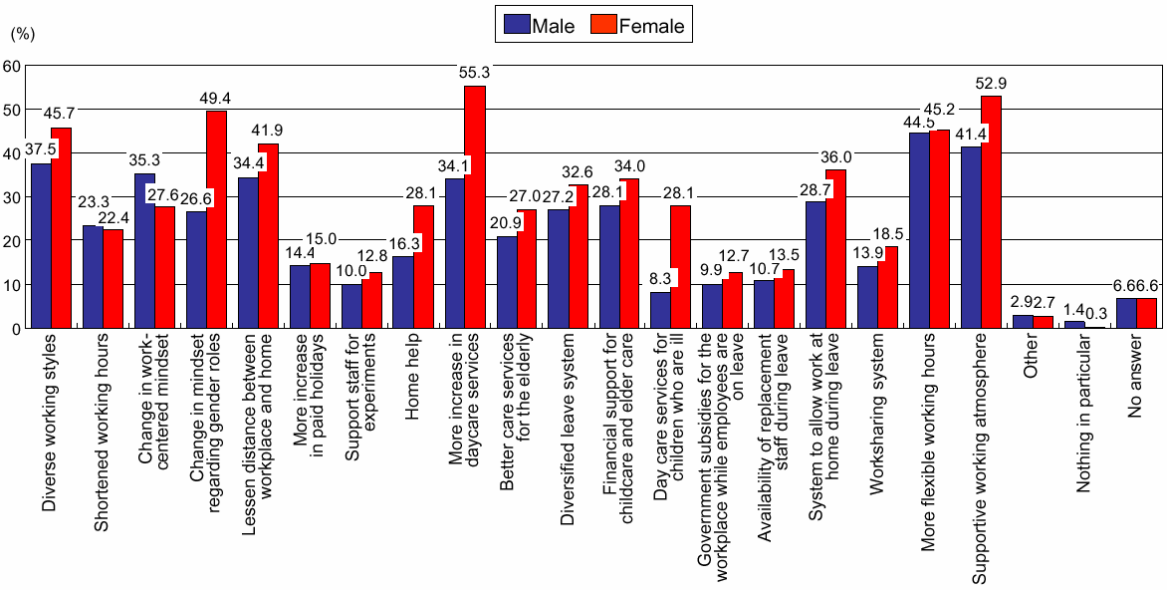

Fig. 2.51 Factors necessary to maintain a balance between work and childcare, caring for sick family members and/or time for oneself

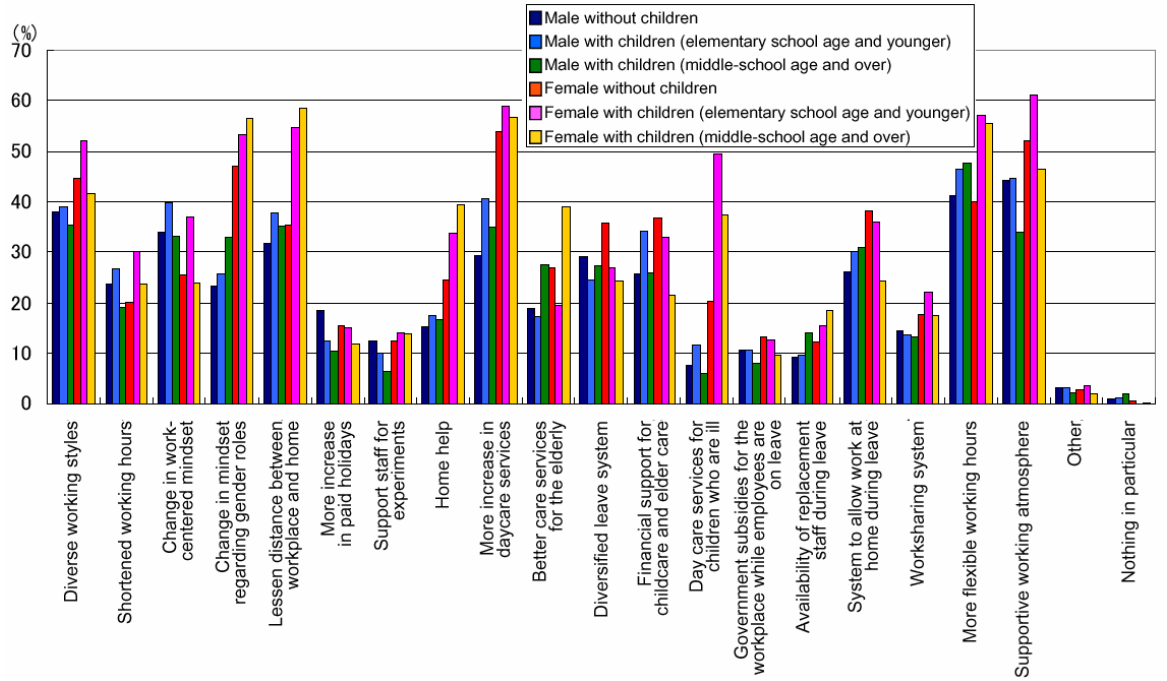

Fig. 2.52 Factors necessary to maintain a balance between work and family life by presence and age of children

2.1.5 Equal Participation of Men and Women

Proportion of Female Researchers and Engineers

Most men and women chose “difficult to maintain family and career” as a reason for the small female presence in the science and engineering fields. Also, many men and women chose “women’s mindset” as a reason. More female than male respondents chose “men’s mindset,” “women hired less often than men,” “difficult to attain managerial positions,” or “lack of role models,” whereas a higher percentage of male respondents (20 %) chose “gender-based differences in aptitude”.

Albeit a minority, 13 % of female respondents also chose “gender-based differences in aptitude.” Figure 2.54 shows the degree of female presence in the three categories of member societies, grouped into high, medium, and low. (See Appendix A2 for the classification criteria.) Regardless of gender, the percentages of respondents who chose “educational environment,” “gender-based differences in ability,” “gender-based differences in aptitude” were related inversely to the degree of female presence, whereas the percentages of respondents who chose “men’s mindset” and “difficult to attain managerial positions” were proportionate to the degree of female presence. Members of societies with fewer women tended to choose reasons that fault women (including “educational environment”), while societies with more women tended to choose reasons that fault men (very often men determine staff promotions to managerial positions). This is interesting, although it is understandable that the higher the female ratio is in an academic society, the more likely it becomes that both male and female members tend to think that the reason for the lower female ratio in the science and engineering fields is because of men.

In any case, the fact that “difficult to maintain family and career” was the most frequent answer among both men and women implies that the entire responsibility of domestic affairs and childcare is imposed on women.

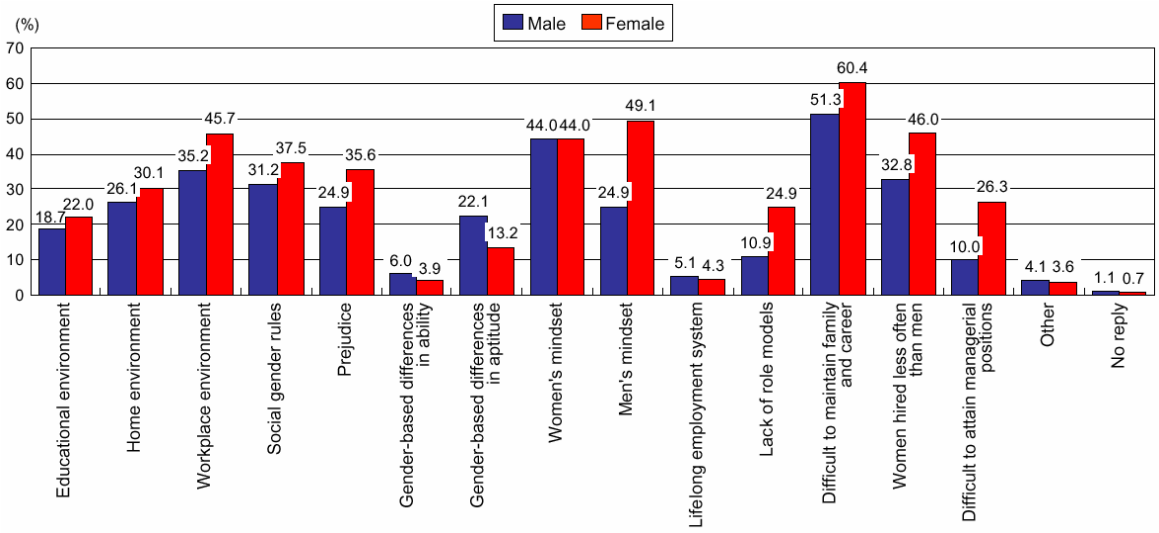

Fig. 2.53 Reasons for low proportion of female researchers and engineers

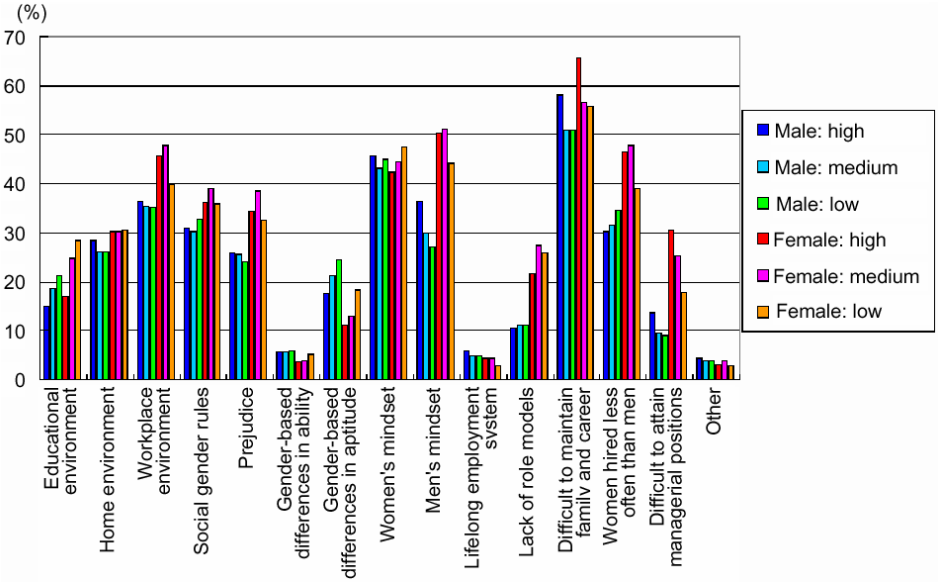

Fig. 2.54 Reasons for low proportion of female researchers and engineers by degree of female presence (see Appendix A2 for classification criteria)

Proportion of Women in Leadership Positions

As reasons for the low proportion of women in leadership positions, both men and women frequently chose “difficult to maintain family and career” and “many women leave work or take leave mid-career.” However, most (over 60 %) of the female respondents chose “evaluators’ mindset or tendency to give preference to men” as the reason. Women also gave “workplace environment” and “lack of role models” as important factors. The percentage of female respondents who chose “women are less eager for promotions than men” was 16 %, about double that of male respondents. Meanwhile almost 20 % of men chose “gender-based differences in aptitude” as a reason.

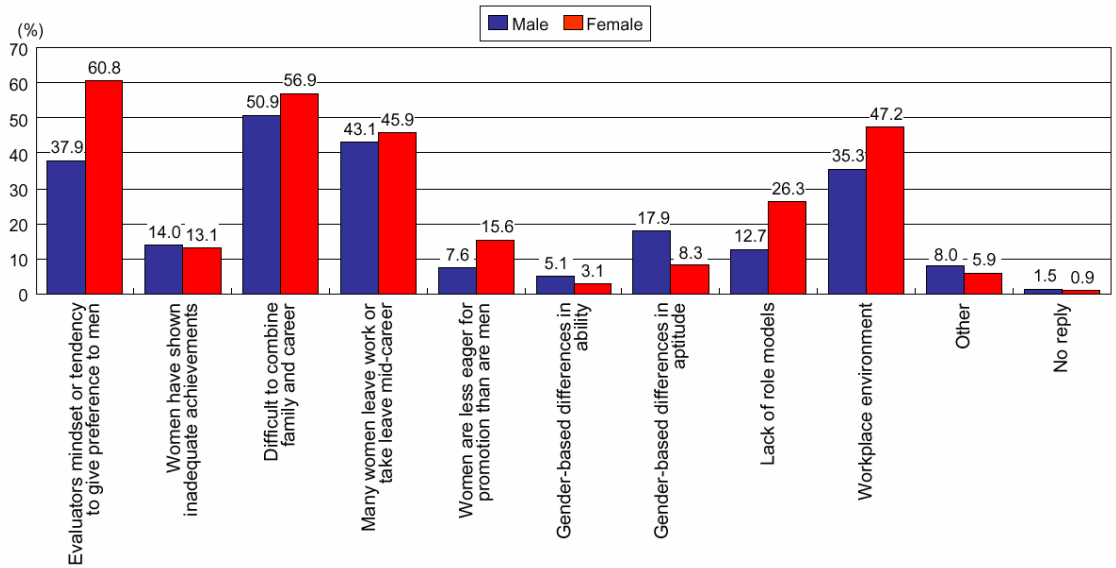

Fig. 2.55 Reasons for low proportion of women in leadership positions

Gender Gap Regarding Compensation/Promotion Issues in the Science and Technology Fields

About half of men and three-quarters of women answered "there is a gender gap regarding compensation or promotions in the science and engineering fields."[*7] There was no apparent difference in the answer to this question among the respondents from different types of organizations. For every option listed as a gender gap issue, the number of women who chose it was higher than that of men (multiple selections were allowed), indicating a strong dissatisfaction with the current situation.[*8] Most men and women chose "hiring," "promotion to managerial positions," and "promotions and pay raises" in that order as areas where the gender gap was most apparent. Compared to men, noticeably more women chose "assignment of office chores ,"[*9] "evaluation of achievements," "sponsorship/support for research and development," and "opportunities for further study/sabbatical domestically and abroad." When comparing the results among the organizations they are affiliated with, the percentages of both men and women who chose "promotions and pay raises," "evaluation of achievements," "opportunities for further study/sabbatical domestically and abroad," and "training opportunities" as areas of discrepancy were higher in the corporations than the other types of organizations. On the other hand, a slightly higher percentage of respondents from universities chose "hiring."

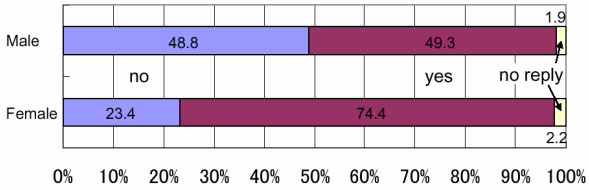

Fig. 2.56 Is there a gender gap regarding compensation/promotion in the field of science and technology?

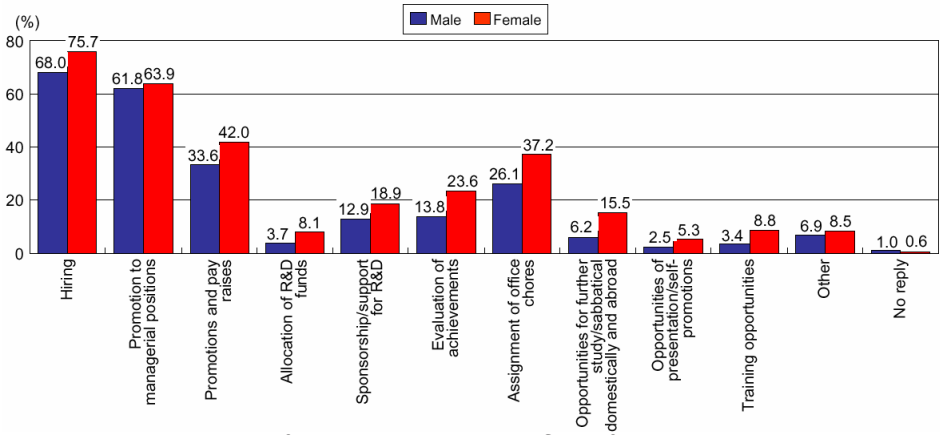

Fig. 2.57 Areas of discrepancy within the field of science and technology

[*7] We examined the data relative to the respondents' positions, but found no significant differences due to position regardless of compensation/promotion issues.

[*8] Prof. Tsugawa's research [1, p. 20] found a wider gap between men and women. It is probably because the difference between the questions asked in this survey and Prof. Tsugawa's survey: we asked "do you think there is a gender gap…?" whereas Prof. Tsugawa asked "have you experienced or heard that there is a gender gap…?" Far fewer men responded positively to these questions in Prof. Tsugawa's survey. This may indicate that not many men have actually experienced or heard of discrimination, although they believe that gender discrimination may exist.

[*9] As described on page 16 women spent more hours on research and development than men did. However, women who chose "assignment of office chores" as area of discrepancy spent less time on research and development (32 hours on average) compared to other women (35 hours on average). This is similar to men's average of 31 hours.

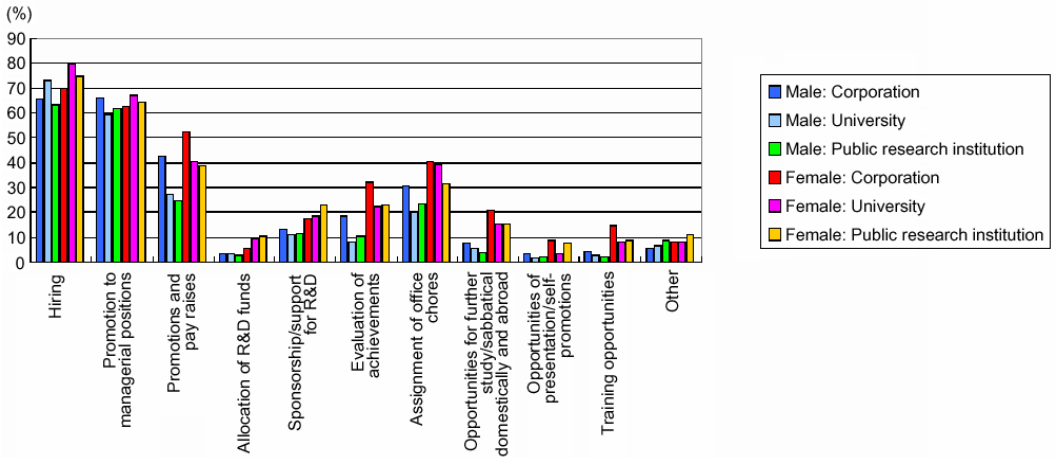

Fig. 2.58 Areas of discrepancy within the field of science and technology by type of affiliated organization

Ways to Promote Gender Equality

Again, for every option listed as an answer to this question, the number of women who chose it was higher than that of men. Most women chose "change in men's mindset."[*10] A high percentage of both men and women chose "improve the workplace environment." Many of both men and women chose "men/women should balance family and careers," but it is worthwhile to mention that a particularly high percentage of women chose "men should balance family and careers." The other answers where a gender gap was apparent were: "improve the understanding/cooperation of supervisors," "establish a time-limited period of affirmative action for women," "abolish job-related age limits," "increase opportunities for women researchers to network," "allow married couples retain their original surnames," and "improve system of limited-term positions."

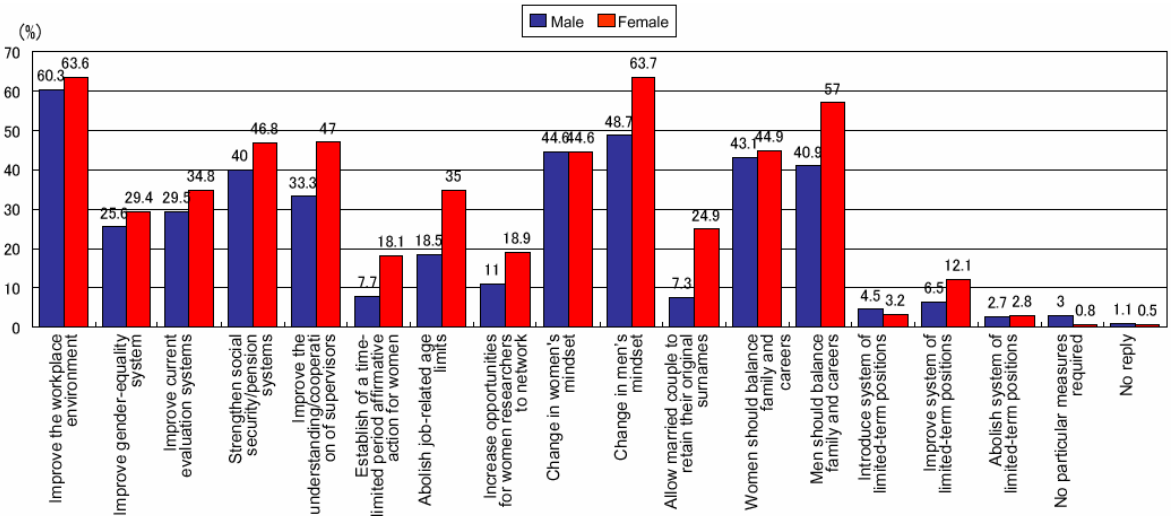

Fig. 2.59 Ways to promote gender equality

[*10] We did not specify the meaning of the answer "change in mens' mindset" in this survey. Balancing career and family would be included in this, but further research is required.

2.2 Detailed Analysis of Important Issues

2.2.1 Gender Gap in Positions

As described in Section 2.1.1 (p. 15, “Current Position”), when we compiled all the data it became apparent that the higher the position is, the smaller the percentage of women is that hold those positions. We examined this trend further by taking age distribution in consideration. We used a position index in order to analyze the data quantitatively. The position index was the same used in the gender equality survey conducted by The Japan Society of Applied Physics in 2001 [7], and is defined as follows: for each organization, job positions are aligned from lowest to highest between 0 and 10, and based on the number of people in the organization, the aggregate median value is defined as the position index. For example, if a corporation has entry-level employees, team/group leaders, section head, department/division head, operations managers, and executive directors, and their respective percentage in the number of employees to the total number of employees are 27 %, 23 %, 15 %, 2 %, and 7 %, then the position index for respective positions would be 1.4, 3.9, 6.3, 8.4, 9.2, and 9.6. Figure 2.60 shows the position index for corporations, universities, and public research institutions, based on the actual position distribution data. This allows us to compare positions between different types of affiliated organizations and age groups.

Figure 2.61 shows the job position index by gender and age group for each type of affiliated organization. In all three types of organization, a significant gender gap occurred in every age group. Since there are not many women over 50 years old in corporations, it is difficult to discuss the gender gap for these age groups quantitatively, but we can see that women in their 30’s lagged behind men in promotions by approximately two years and by 3 to 4 years in the 40’s age group. The gender gap in corporations was smaller for the age groups under 40, relative to the other organization types. On the other hand, the gender gap in the position index at universities was very wide, and women lagged behind men in promotions by more than 5 years. If we look at just the averages, men were usually promoted to associate professor in their late 30’s and to professor in their late 40’s, whereas women were promoted to lecturer in their late 30’s, associate professor in their late 40’s, and then do not become full professors before their 60’s.

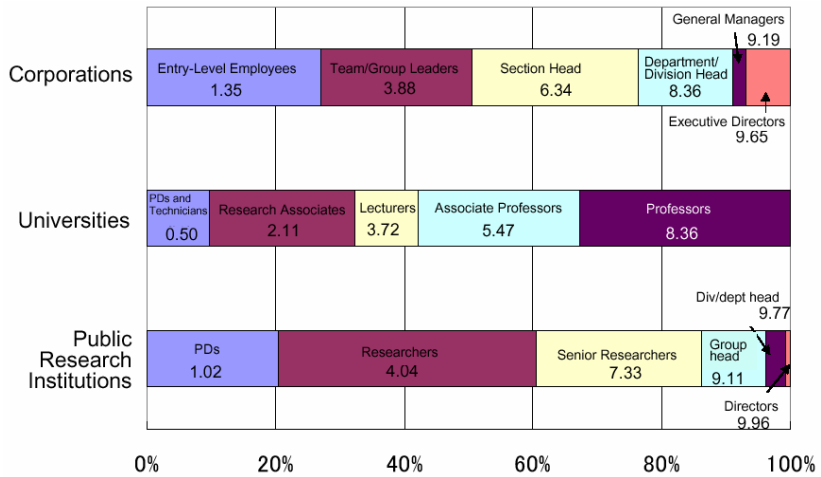

Fig. 2.60 Definition of job position index

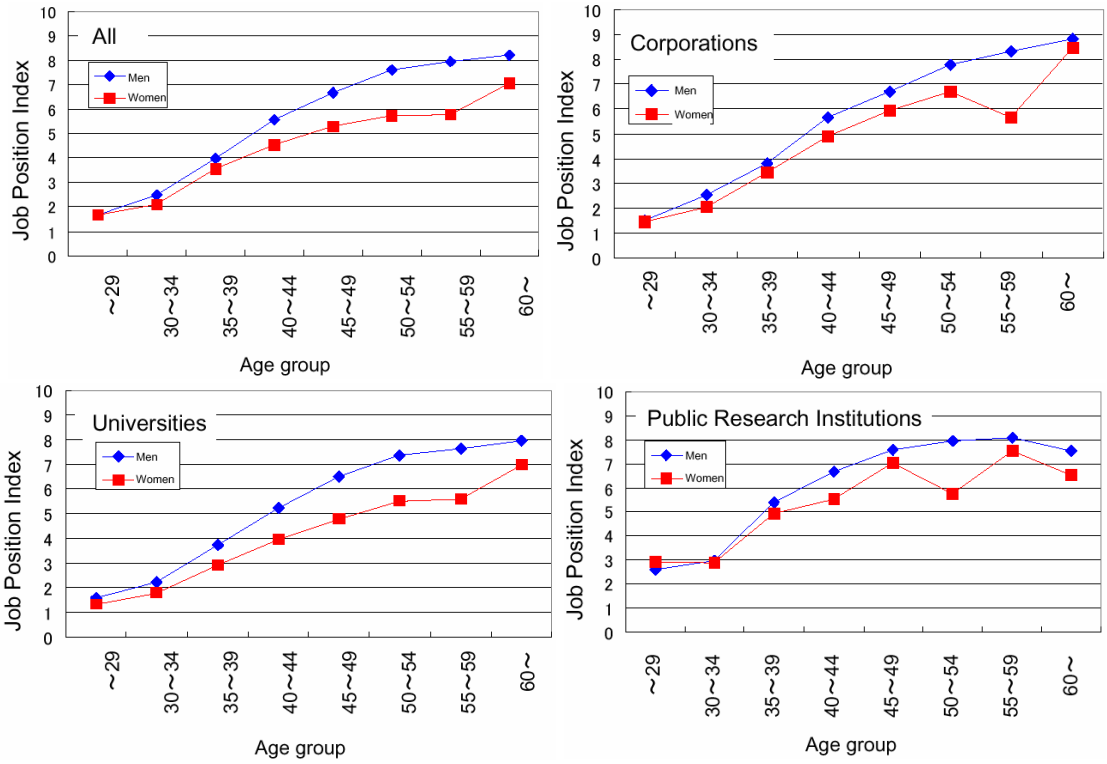

Fig. 2.61 Job position index by gender and age group for each type of affiliated organization

In order to examine the gender gap in positions at universities in more detail, we compiled the results for each academic field (Fig. 2.62). In the field of physics, the gender gap began to appear in the 40's age group, and the job position index for women peaked at about 4. This indicates that women in these age groups were not being promoted to associate professors. This tendency was also apparent in the surveys described earlier, which were conducted by JSAP [7] and JPS [8] at about the same time. Our survey confirmed that the issues surrounding job positions in the physics field at universities, pointed out by these earlier surveys, still persist. The "associate professor wall" for women also clearly exists in the chemical and material engineering field, where the gender gap starts in the 30's age group. In the field of life science and biology where the female presence is relatively high, the gender gap is not as wide as in the preceding two fields, but a gender gap did occur across all age groups. The job position index for women peaked at 5+ (senior associate professor level) in the late 50's age group. Even though female researchers in the life science and biology field are working hard in a demanding environment with long working hours, a "professor wall" still exists which is hard to overcome. It is interesting that there was no gender gap in the civil engineering field, where the female presence was relatively high. Although the data are not very reliable due to the small sample size for the electronics and information field and mechanical engineering field where the female presence is low, the gender gap in these fields was also narrow.

We also examined the number of subordinates and the size of the research and development budget by gender for each type of affiliated organization, as shown in Fig. 2.63 and Fig. 2.64, to see if there were any other gender gaps missed by the job position index.

With corporations, the number of subordinates for both men and women increased in proportion to the age group, peaking at approximately 13 for men and approximately 9 for women. The increase

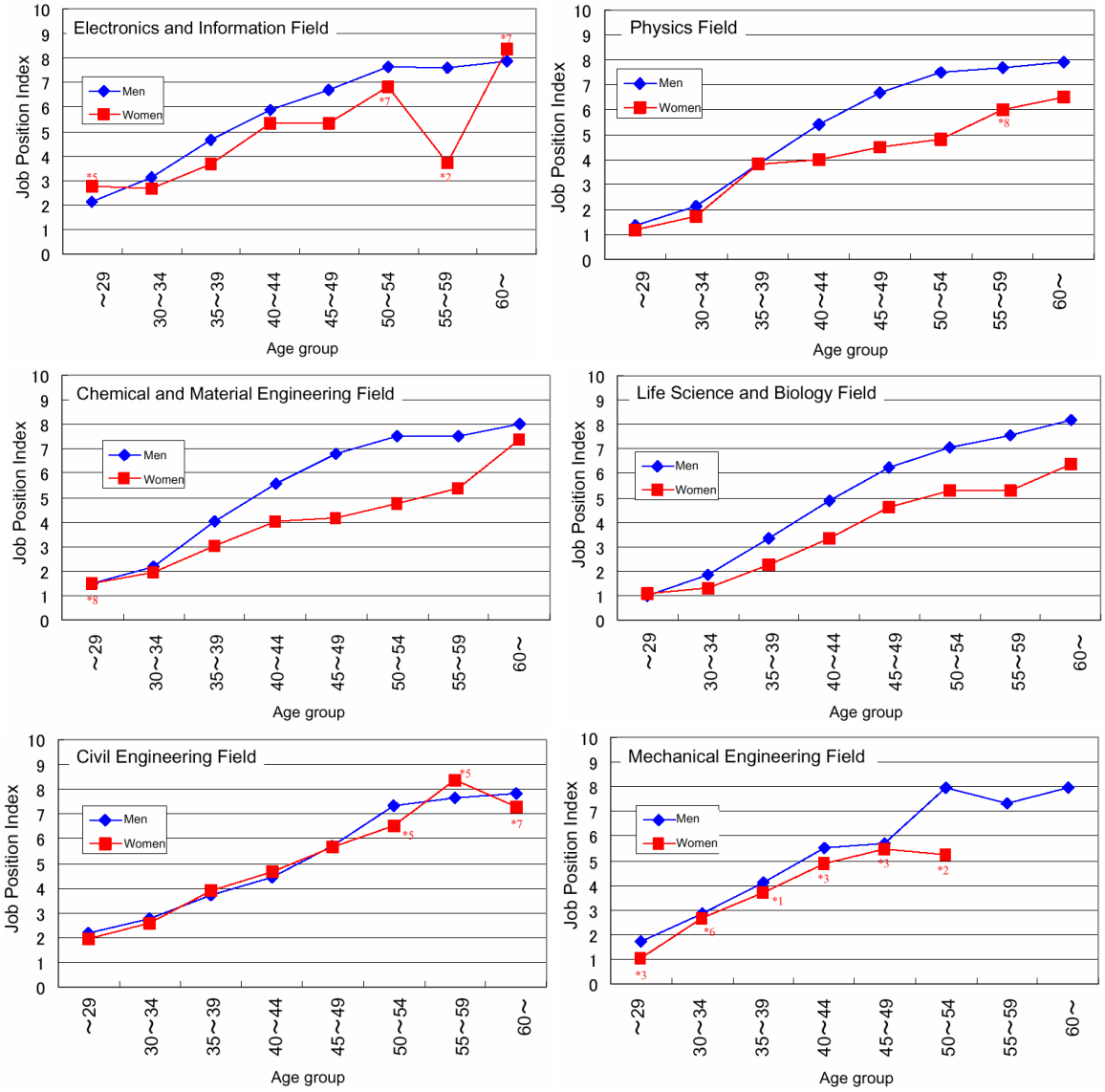

Fig. 2.62 Job position index at universities by academic field

in the number of subordinates for women tended to lag behind men, as with the job position index, but this lag seemed to be even bigger than for promotion. The results were similar for the research and development budgets. With universities, the number of subordinates for women barely increased for women in the higher age groups, and typically stayed at 3 to 4 subordinates, which is equivalent to men in the 30's age group. Therefore, the gender gap here is clearly wider than seen with the job position index. The same can be said for the research and development budget.*11 The gender gap at public research institutions was even more extreme. Although the gender gap in the job position index was narrower at public research institutions than at universities, the gender gap in the number of subordinates and the research and development budget was clearly wider.*12

*11 The data in Fig. 2.64 includes those from part-time and limited-term full-time respondents. However, the patterns of data solely from permanent full-time respondents are similar.

*12 At public research institutes, both the number of subordinates and the size of the research and development budget for

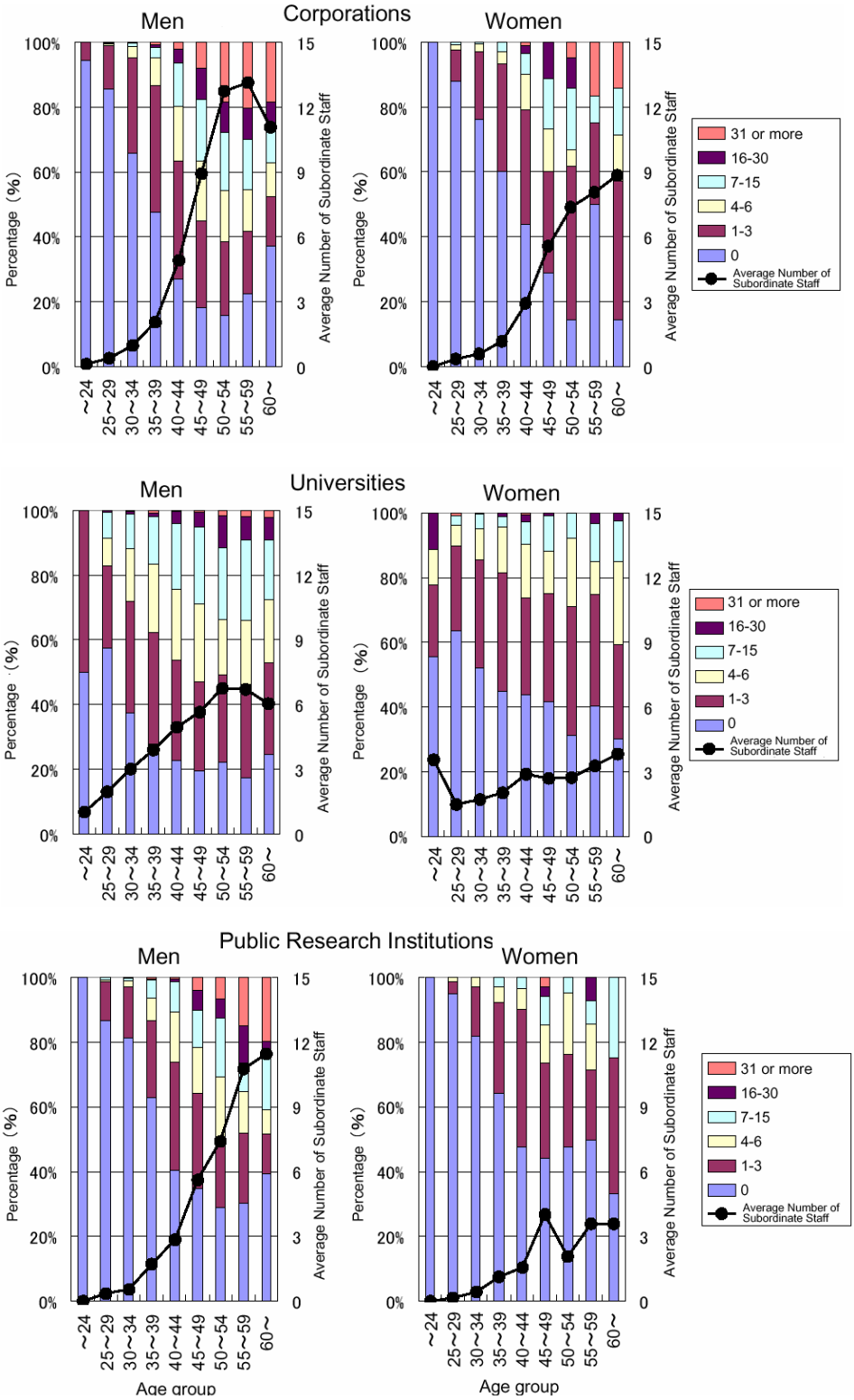

Fig. 2.63 Number of subordinate staff by type of affiliated organization

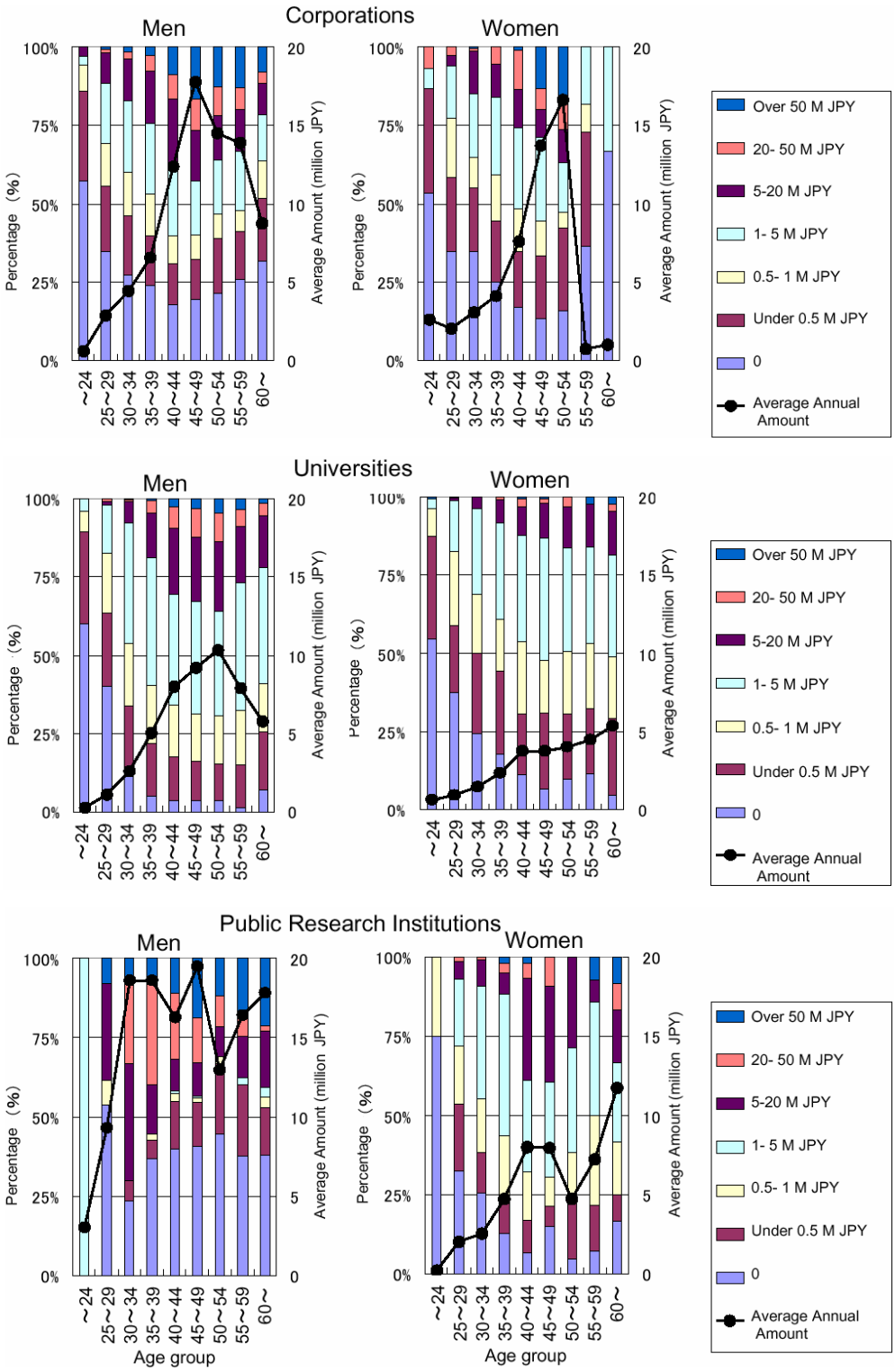

Fig. 2.64 Annual research and development budget by type of affiliated organization

To summarize the above, the survey results clearly showed a significant gender gap in the job positions of the science and engineering fields and that the gender gap was even wider in the distribution of resources, such as subordinates and research and development budget, which are critical for research and development projects.

2.2.2 Childcare Leave

In Section 2.1.4 (“Child Care Leave,” p. 28), we reported that approximately 40 % of women had taken childcare leave as opposed to just less than 2 % of men. In order to examine the current situation of childcare leave taken by women in detail, we compiled the percentage of women who had taken childcare leave by age group for each type of organization (Fig. 2.65).*13 The vertical axis indicates the percentage of mothers who had taken childcare leave. For corporations, the percentage of mothers who had taken childcare leave was extremely high for the younger age groups, as they probably took advantage of the new Childcare Leave Law. The percentage was almost 90 % in the 30’s age group. In contrast, the percentage of mothers who had taken childcare leave at universities or public research institutions remained at some 50 % for the same age group, although it was higher with the younger generations as well.*14 Considering that about 10 % of the women even in the older age groups had

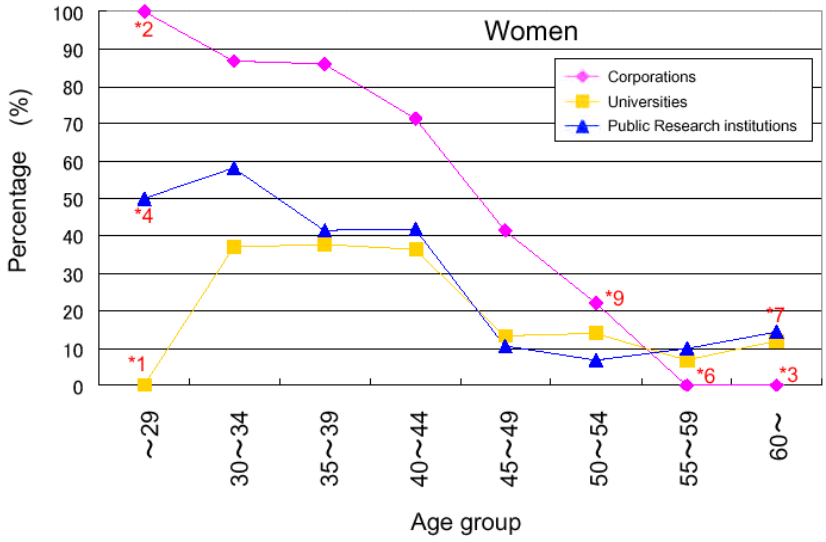

Fig. 2.65 Percentage of women with children who took childcare leave, by type of affiliated organization

male researchers tend to be polarized with age, between the high-ranking researchers and ordinary researchers. The proportion of female researchers in the high-ranking positions is extremely low at these institutes, and the distribution of the female researchers’ job titles mainly span from the low to medium ranks.

*13 As for men, the percentage of men who have taken childcare leave increased with the younger generation, but there was no difference among different types of organizations, other than that the percentage of men in their 20’s who have taken childcare leave was higher for corporations than universities or public research institutes.

*14 According to a research [9] conducted by the former Ministry of Labor in 1999, 76.3 % of working women who worked for companies with 500 or more employees and 71.4 % of working women who worked for companies with 100 to 499 employees had taken childcare leave in 1998. The high percentage of the women who have taken childcare leave indicated in this survey was probably because many of the researchers and engineers who work in the private sector work for large corporations. The percentage of the women who have taken childcare leave at universities and public research institutes indicated by this survey is very low compared to the data from the survey conducted by the Ministry of Labor.

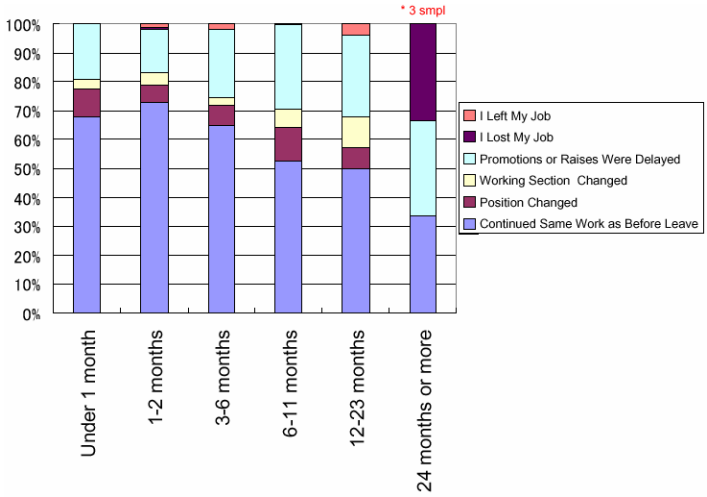

Fig. 2.66 Length of childcare leave and its effects (women only)

taken childcare leave at universities and public research institutions, it seems that the Childcare Leave Law enacted in 1992 is not benefiting working women at universities and public research institutions as much as at corporations.

As for the effect of taking the childcare leave, almost all men answered that they were able to continue the same work as before, but approximately 30 % of women responded that their promotions or raises were delayed (Fig. 2.49). Figure 2.66 shows the relationship between the duration of childcare leaves and the effects. As childcare leaves become longer, the percentage of women who were able to continue the same work as before decreased, whereas the percentage of women who claimed that taking a leave delayed promotions or raises increased. If we look at the age distribution of the women who thought their promotions or raises were delayed, they were mostly in their 30's to early 40's, indicating that more than 30 % of women in these age groups who took childcare leave have such perceptions.*15 This means that these issues have not been relegated to the past, but are still urgent concerns at this very moment, facing working women who give birth to and raise children.

Options to have children as they wish and to take childcare leave as needed without any repercussions are critical to balancing work and family life. This survey made it clear that women working in the science and engineering fields are under strong pressure to choose between work and family.*16 Furthermore, men are completely disconnected from these issues. These data seem to reflect an extremely unbalanced situation, which is far from the ideal gender-equal society where different values are respected regardless of the gender.

*15 Men who thought that their promotions/raises were delayed as a result of taking childcare leave were all in the higher age groups, and there were hardly any men in their 30's or 40's who claimed any disadvantage associated with taking childcare leave.

*16 Figure 2.13 on p. 12 indicates that it was difficult for older generations to have children, especially for women that are now 40 and over and working at universities or public research institutes, and for women of 50 and over working at corporations.

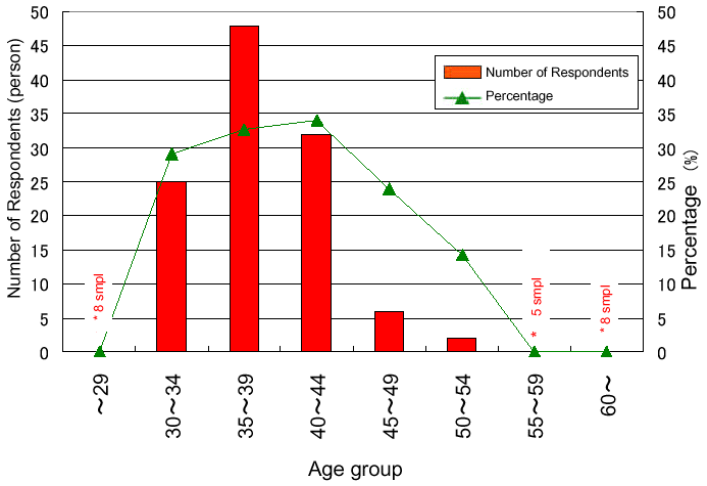

Fig. 2.67 Number and percentage of women who thought taking childcare leave delayed promotions/raises

2.2.3 Limited-term Full-time Positions and Part-time Positions Including Postdocs

As the government promotes the Science and Technology Basic Plan, more and more researchers, especially in younger generations, are working as limited-term full-time contractors (including post-doctoral positions) or as part-time employees. As described in section 2.1.3 (“Limited Term Contracts,” p. 27), there are positive aspects to these positions, as they offer a way for people to return to work after taking childcare leave and they can revitalize research organizations. However, they also pose many issues for young researchers who want careers as independent researchers. Problems associated with these positions include the lack of job security, poorer treatment under the social security system, a shortage of discretionary research budgets, etc.

The analysis in this section focuses on the research budget for full-time positions with limited contracts and part-time positions, mainly post-doctoral positions. Figure 2.68 shows the distribution of the annual research budgets for postdoctoral positions in each academic field. Overall, more than 20 % of the postdocs answered that they had no budget for their discretionary use. In particular, over 30 % of postdocs in physics were allowed zero research budget. Although they may have a separate travel or supplies budgets, the fact that they answered “0” indicates that the respondents perceived that they have no freedom to conduct their own research when cost is an issue.

Figure 2.69 compares the annual research budgets among permanent full-time, full-time with limited-term contract, and part-time respondents, including postdocs. We compiled only the data from respondents in their 30’s. We chose this group because the size of their research budget is a matter of life and death for them, since postdocs of this generation are trying to obtain permanent positions based on their accomplishments made in their 30’s. When comparing men and women, women had smaller budgets than men in each category: permanent full-time, full-time with limited-term contracts, and part-time. For both men and women, the budgets of full-time researchers with limited-term contracts were smaller than that of permanent full-time researchers, and part-time researchers received even less, by a large margin. As much as 60 % of part-time researchers received only a very small budget (up to 500,000 yen per year), and almost 40 % received no budget at all.

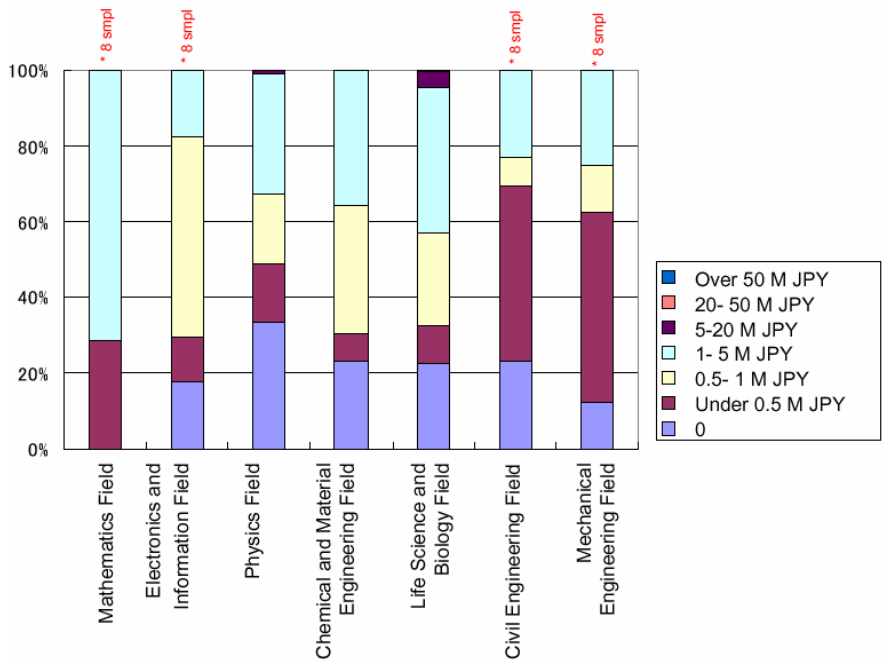

Fig. 2.68 Annual Research Budget for Postdoctoral Positions in Each Academic Field

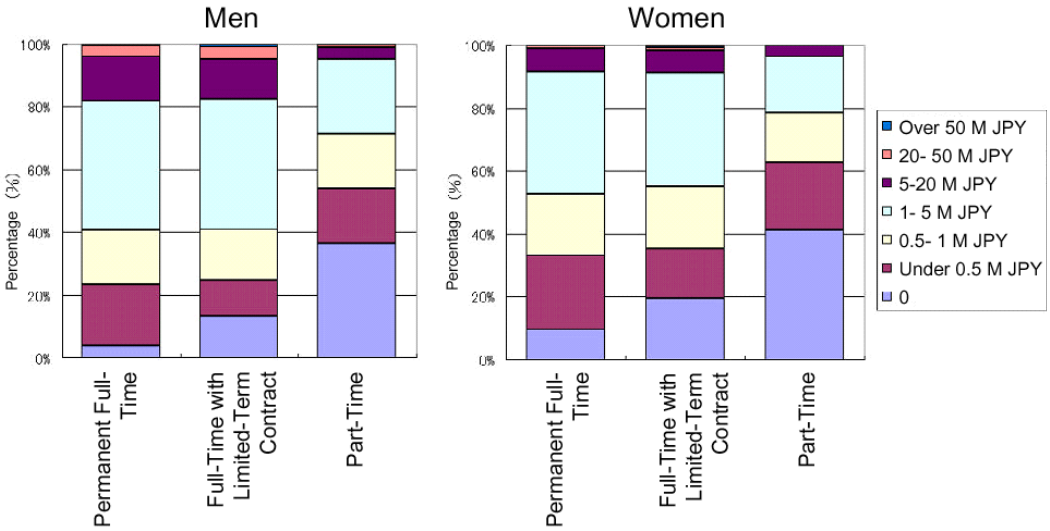

Fig. 2.69 Annual Research Budget among Permanent Full-Time, Full-Time with Limited-Term Contract, and Part-Time 30's Respondents

Only full-time researchers can apply for public grants for science and research projects.*17 Similar constraints exist in many of the other governmental or private research support systems. The current situation is nothing but unfair, where the mere position of employment determines whether or not a research budget is available. This is a particularly dire issue for women who are already disadvantaged in terms of research budgets compared to men.

*17 Technicians are not allowed to apply for budgets even if they are in full-time positions.

Chapter 3

Issues and Recommendations

3.1 Current Situation and Issues

The survey revealed the following circumstances and issues:

- Regardless of the gender, most of the researchers and engineers chose their current occupations under their own initiative and with positive attitudes. Also, hardly any gender difference was observed in their awareness of the requirements for research and development. Many respondents wanted environments that foster long-term projects and freedom in research and development, in addition to the fundamental resources, such as funding, equipment, and time. On the other hand, it is worthwhile to mention that many researchers and engineers thought gender equality should be promoted through the "improvement of the workplace environment" and "balancing family and career." They seemed to be attending not only to work but also to family and community, which should be respected.
- There is clearly a gender gap in the treatment of men and women in the science and engineering fields. We found gender inequality in the rank of their positions, but the gender inequality in the allocation of basic resources necessary for research and development, such as the number of subordinates and funding, was even greater. Women are relatively disadvantaged. Although various government policies to promote women's participation in society have improved the treatment of women at corporations, quite a few problems still remain, as shown by the dissatisfaction with the treatment after taking childcare leave and also by the gender gaps seen in the number of subordinates and research and development funding. At universities and public research institutions, the gender gap in positions was extremely wide, but the gender gap was even wider in the allocation of research resources. It is hardly a rewarding environment for female researchers' hard work.
- One cause for the above gender inequality may be the social pressure imposed only on women to reconcile family life with work. The current situation, where female researchers and engineers have far fewer children than men, seems almost abnormal. "Difficult to combine family and career" was chosen as one of the reasons for a smaller female presence in the science and engineering fields and in leadership positions. This is a result of the long-standing tradition that made family affairs and childbearing the responsibility of women, and locking in the roles of men and women. We should pay attention to the fact that many female respondents chose "change in men's mindset" and "men should balance family and careers" as requirements to realize a gender-equal society, and that they chose "evaluator's mindset or tendency to give preference to men" as a reason that fewer women are attaining leadership positions.

- The limited-term employment system has room for improvement. Unfounded age limits on employment should be eliminated, considering that the limited-term employment system is currently (or may be) serving as an effective way for researchers and engineers to return to work after taking a leave of absence due to childbearing, etc. However, limited-term or part-time employees are obviously receiving detrimental treatment compared to permanent full-time employees in terms of research budget funding. This poses a problem, since it could limit the opportunities for limited-term or part-time employees to have freedom of research.

3.2 Recommendations

Even within the fields of science and engineering, different people have different values and pursue different goals. Ideally, there should be diverse options available for both men and women. We would like to make the following recommendations based on the above survey results, in order to achieve a truly gender equal society where diverse values are respected regardless of gender.

- Make it easy for employees to take leaves as needed to balance work and family lives, such as for childcare. In particular, universities and public research institutions are urged to improve their environments. We also need to promote men's commitment to family and society, in order to balance the roles between men and women, since they are currently extremely unbalanced. Encourage men to increase their contributions to family and society through various measures, such as childcare leave.
- Ensure that any gender discrimination from hiring and promotional decision making processes is completely eliminated. People in leadership positions should realize that in fields where the ratio of men and women is extremely unbalanced, such as in the science and engineering fields, the small female presence itself could become a limiting factor for women trying to make full use of their abilities.
- Eliminate unfounded age limits on various limited-term (or part-time) positions. These positions should be available as important steps for men and women that want to re-challenge themselves.
- Improve the research funding system for part-time researchers to allow them the freedom to conduct research independently. In particular, special attention should be paid to female researchers who would benefit from additional consideration since they are often disadvantaged in terms of allocation of research resources.

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[9] Ministry of Labor, Women’s Office, Women’s Welfare Division: “FY1999 Basic Survey on Working Women” (2000).

Appendix

A1 Questionnaire

Questionnaire Adapted from Gender Equality Survey of Science and Technology Professionals

1. Age □ 24 or under □ 25-29 □ 30-34 □ 35-39 □ 40-44 □ 45-49 □ 50-54 □ 55-59 □ 60 or above
2. Gender □ Male □ Female
3. Marital status □ Married □ Single
4. Children How many children do you have? □ None □ 1 □ 2 □ 3 □ 4 or more
   Their age(s) (mark all that apply): □ Below school age □ Primary school age □ Junior High school age □ High school age □ Undergraduate Working □ Other
5. What is your highest academic degree? □ Undergraduate □ Master's □ Ph.D. □ Other
6. Do you hold a doctoral degree? If you do, what type of degree is it? Mark both "course" and "non-course" if appropriate. □ I don't have a doctoral degree □ Course □ Non-course
   (Note: "Course" doctorates are conferred upon those who complete graduate school courses, whereas "non-course" doctorates do not require enrollment in the graduate school.)
7. To which academic societies do you belong? Mark all that apply.
   □ The Mathematical Society of Japan □ The Physical Society of Japan
   □ Atomic Energy Society of Japan □ Astronomical Society of Japan
   □ Japanese Society for Biological Sciences in Space □ The Japan Society of Applied Physics
   □ The Magnetics Society of Japan
   □ The Institute of Electronics, Information and Communication Engineers
   □ Information Processing Society of Japan □ The Chemical Society of Japan
   □ The Society of Chemical Engineers, Japan □ The Electrochemical Society of Japan
   □ The Society of Polymer Science, Japan □ The Japan Society for Analytical Chemistry
   □ The Japanese Biochemical Society □ The Japanese Society of Plant Physiologists
   □ The Biophysical Society of Japan □ Protein Science Society of Japan
   □ Physiological Society of Japan □ The Japan Society for Comparative Endocrinology
   □ The Zoological Society of Japan □ The Molecular Biology Society of Japan
   □ The Japanese Society of Developmental Biologist □ Japan Society for Cell Biology
   □ The Japanese Geotechnical Society □ The Institute of Image Information and Television Engineers
   □ Society of Automotive Engineers of Japan, Inc. □ The Illuminating Engineering Institute of Japan
   □ The Japan Society for Precision Engineering □ The Japan Society of Mechanical Engineering
   □ Architectural Institute of Japan □ The Iron and Steel Institute of Japan
   □ Japanese Liquid Crystal Society □ The Society of Japanese Women Scientists
   □ Japanese Women Engineers Forum
   □ Society of Geomagnetism and Earth, Planetary and Space Sciences □ The Japan Institute of Metal
   □ Japan Association for Fire Science and Engineering □ Japanese Society for Mathematical Biology
   □ Other
8. What is your current employment status? □ Student □ Full-time employee (permanent position)

□ Full-time (with limited-term contract) □ Part-time employee □ Unemployed □ Other

If you are employed on a limited-term contract, how many years is your term? □ Less than 2 years □ Over 2 but less than 3 years □ Over 3 but less than 5 years □ 5 years or more

Is your contract renewable? □ Yes □ No

9. What type of organization do you belong to? (If you have left work, please respond to questions 9-16 with your most recent position in mind.) □ Corporation □ National university
□ Public university (municipal) □ Private university □ Other educational institution
□ Public research institution (national research institution, corporation, foundation, etc.) □ Other
10. What is your current position?

Corporation

□ Entry-level employee □ Team/group leader or senior researcher/scientist
□ Section head or laboratory chief □ Department/division head or director
□ Operations manager/director □ Executive director/officer or above □ Other

University

□ Undergraduate student □ Graduate student □ Research student □ Post-doctoral fellow
□ Technician □ Research associate □ Lecturer □ Associate professor □ Professor □ Other

Public research institution

□ Post-doctoral fellow □ Researcher/scientist □ Senior researcher/scientist
□ Team/group laboratory chief/head □ Division/department head or director
□ Operations manager/director □ Other

11. Hours spent at your workplace
11.1 How many hours per week do you spend at your workplace?
□ Under 20 □ 20-39 □ 40-49 □ 50-69 □ 70-89 □ 90 or over
11.2 How many of the above hours do you spend on research and development?
□ 0 □ 1-9 □ 10-19 □ 20-39 □ 40-49 □ 50-69 □ 70-89 □ 90 or over
12. Hours spent working from home
12.1 How many hours per week do you work at home?
□ 0 □ 1-4 □ 5-9 □ 10-29 □ 30 or above
12.2 How many of the above hours do you spend on research and development?
□ 0 □ 1-4 □ 5-9 □ 10-29 □ 30 or above
13. How many people do you supervise? (If you are with a university, how many people do you advise, excluding undergraduates?) □ 0 □ 1-3 □ 4-6 □ 7-15 □ 16-30 □ 31 or more
14. What is your total annual research and development budget, excluding personnel costs? If you are representing your research group or project team, please check the total amount allocated to your group/team.
□ 0 yen □ Under 500,000 yen □ 500,000-1,000,000 yen □ 1,000,000-5,000,000 yen
□ 5,000,000-20,000,000 yen □ 20,000,000-50,000,000 yen □ 50,000,000 yen or above
15. Why did you choose your current occupation? Mark all that apply.
□ For academic satisfaction/intellectual stimulation □ To make full use of my abilities
□ Because I find this work attractive □ To earn a high income □ Job security
□ Able to balance family and career □ Free of gender discrimination □ To benefit society
□ To achieve status/fame □ No other satisfactory work was available □ Because I was offered the job
□ Parents/ friends recommended it □ Near my home □ No relocation required
□ Flexible working hours □ Other
16. Your future career path (For those who have left work, please respond as you would have in your most recent position.)
16.1 In the future, what type of position do you wish to hold? (If you wish to continue in your present position, please respond as such.)
□ Leader of academic research laboratory □ Work in academic research □ Business management
□ Business administration □ Work in research and development in the private sector □ Education

□ Local government □ Entrepreneur □ Not sure □ Other

16.2 Please choose up to 5 factors you consider important in achieving that position. Mark all that apply.

□ Talent □ Dedication □ Physical strength □ Efficiency □ Time spent on work □ Social skills
□ Gender □ Personal connections □ Cooperation from or mentoring by one's supervisors
□ Support from family □ System of hiring, evaluation and promotion □ Social support systems
□ Location of work □ Don't know

16.3 Please rate the likelihood of your achieving your desired position.

□ Already achieved □ Possible with some effort □ Unlikely □ Don't know

17. Have you ever considered leaving/changing your job or have you ever actually left/changed jobs?

□ I have left work □ I have changed jobs □ I have considered leaving work
□ I have considered changing jobs
□ I have neither considered leaving/changing nor actually left/changed jobs

17.1 If you have ever left work or changed jobs, please mark the reason(s). Mark all that apply.

□ To further my career □ Better income □ To avoid relocation required by previous employer
□ Job relocation of family member □ Workplace location □ End of contract □ Marriage
□ Childrearing □ Caring for sick family member □ Concern for the future
□ Gender discrimination □ Difficult personal relations □ Unhappy with previous workplace
□ Laid-off or dismissed □ Other

17.2 f you have ever left or changed jobs, what was your subsequent employment status? Mark all that apply.

□ Full-time □ Full-time (limited-term contract) □ Part-time □ Other

17.3 Into what type of field did you move? Mark all that apply.

□ University □ National /public research institution □ School education-related
□ Private enterprise (research and development)
□ Private enterprise (survey research and consulting)
□ Private enterprise (non-research related work) □ Public administration □ Other

18. What is your view on limited-term contracts (non-tenured positions), including post-doctoral positions?

□ Should be introduced extensively □ Should be introduced cautiously □ Should be abolished
□ Don't know

Reason(s) for your view (mark all that apply)

□ Easy to change jobs □ Able to change jobs based on one's achievements
□ Stimulates/contributes to research development within the organization
□ Facilitates life planning □ Easy to return to work after childrearing break, and the like
□ Cannot tackle/commit to large projects □ Makes life planning difficult
□ Difficult to find next position □ Age restrictions
□ Disadvantages in terms of social security/pensions and the like □ Other

19. If you have children, please answer this question.

19.1 Who was the primary caregiver for your children during working hours before they reached school age? Mark all that apply.

□ Myself □ My spouse □ Cohabiting relatives □ Relatives or friends □ Day care center
□ Babysitter

19.2 To what extent were you able to take childcare leave?

□ Received sufficient leave □ Received leave, but it was insufficient □ Did not receive leave

Reason(s) (mark all that apply)

□ I received support and understanding from my workplace
□ I wanted to look after my children myself
□ I couldn't find anyone to look after my children
□ I received leave until my children entered day care
□ I didn't want to interrupt my career □ I didn't want my income to decrease

□ I didn't feel it was necessary □ I was able to find someone to look after my children
□ There was no leave system
□ There was an adequate leave system, but my workplace environment prevented me from taking leave □ Other

If you took leave, what was the average duration per each child, exclusive of maternity leave?
□ Less than 1 month □ 1-3 months □ 3-6 months □ 6-12 months □ 12-24 months
□ 24 months or more

19.3 If you took childcare leave, what was the subsequent effect on your working conditions? Mark all that apply.
□ Continued same work as before leave □ Position changed □ Working section changed
□ Pay increases and promotions were delayed □ I lost my job □ I left my job

19.4 How much childcare leave has your spouse taken (average per child, excluding maternity leave)?
□ N/A-Unemployed □ Did not receive leave □ Less than 1 month □ 1-3 months □ 3-6 months
□ 6-12 months □ 12-24 months □ 24 months or more

If your spouse did not take leave, what were the reason(s)? Mark all that apply.
□ Too busy at work □ Didn't want income to decrease
□ Didn't feel it necessary □ There was no leave system
□ There was an adequate leave system, but my workplace environment prevented me from taking leave □ We were able to find someone to look after our children □ Other

20. What do you think is necessary to maintain a balance between work and childcare, caring for sick family members, and/or time for oneself? Mark all that apply.
□ Diverse working styles □ Shortened working hours □ Change in work-centered mindset
□ Change in mindset regarding gender roles □ Lessen distance between workplace and home
□ More paid holidays □ Support staff for experiments □ Home help □ More daycare services
□ Better care services for the elderly □ Diversified leave system
□ Financial support for childcare and elder care □ Day care services for children who are ill
□ Government subsidies for the workplace while employees are on leave
□ Availability of replacement staff during leave □ System to allow work at home during leave
□ Work-sharing system □ More flexible working hours □ Supportive working atmosphere
□ Other □ Nothing in particular

21. How should organization handle those who take leave to care for children or sick family members? Mark all that apply.
□ Reduce pay for duration of leave □ Delay pay raises and promotions for the duration of leave
□ Continue to delay pay raises and promotions subsequent to leave
□ Give special consideration in the performance review to those who take leave
□ Deal with each case on an individual basis according to the person's ability and track record
□ Strict performance-based evaluations □ Other □ I don't know

22. What sort of environment and opportunities are necessary to further research and development? Mark all that apply.
□ Time for research and development □ Facilities for research and development
□ Research and development funds □ Sponsorship/support for research and development
□ Opportunity for further study domestically and abroad □ Understanding/cooperation of supervisors
□ Guidance by advisors □ Freedom in research and development
□ Environment fostering long-term projects □ Presence of collaborating researchers
□ Opportunities to educate students, entry-level employees, etc.
□ Opportunities to present research findings □ Evaluation of research achievements
□ Appropriate evaluation of ability □ Other's expectations of success □ Other

23. Mark all that apply.

23.1 Why to you think there are fewer women than men in the science and technology fields?

□ Educational environment □ Home environment □ Workplace environment
□ Social gender roles □ Prejudice □ Gender-based differences in ability
□ Gender-based differences in aptitude □ Women's mindset □ Men's mindset
□ Lifetime employment system □ Lack of role models □ Difficult to maintain family and career
□ Women hired less often than men □ Difficult to attain managerial positions □ Other

23.2 What do you think is the reason(s) for the low proportion of women in leadership positions?
□ Evaluators' mindset or tendency to give preference to men
□ Women have shown inadequate achievements □ Difficult to combine family and career
□ Many women leave work or take leave mid-career
□ Women are less eager for promotion than are men □ Gender-based differences in ability
□ Gender-based differences in aptitude □ Lack of role models □ Workplace environment □ Other

23.3 Do you think there is a gender gap regarding compensation or promotions in the science and technology fields? □ Yes □ No
If yes, in what area(s) (mark all that apply)
□ Hiring □ Promotion to managerial positions □ Promotions and pay raises
□ Allocation of research and development funds
□ Sponsorship/support for research and development □ Evaluation of achievements
□ Assignment of office chores
□ Opportunities for further study/sabbatical domestically and abroad
□ Opportunities for presentation/self-promotion □ Training opportunities □ Other

24. What do you think is needed in future for women to participate fully in the science and technology fields? Mark all that apply.
□ Improve the workplace environment □ Improve gender-equality systems
□ Improve current evaluation systems □ Strengthen social security/pension systems
□ Improve the understanding/cooperation of supervisors
□ Establish a time-limited period of affirmative action for women
□ Abolish job-related age limits □ Increase opportunities for women researchers to network
□ Change in women's mindset □ Change in men's mindset
□ Allow married couples to retain their original surnames □ Women should balance family and careers
□ Men should balance family and careers □ Introduce system of limited-term positions
□ Improve system of limited-term positions □ Abolish system of limited-term positions
□ No particular measures required

A2 Academic Societies Involveded in This Survey Project

The following 39 academic societies, including 21 full members and 17 observers of EPMEWSE, and a guest collaborator have participated in this project. The labels shown in the parentheses are used to refer them in this report instead of their official abbreviations.

Full Members (Name, [label used in the report/official abbreviation])

The Japan Society of Applied Physics (Appl. Phys./JSAP)
The Society of Chemical Engineers, Japan (Chem. Eng./SCEJ)
The Society of Polymer Science, Japan (Polymer Sci./SPSJ)
The Institute of Electronics, Information and Communication Engineers (Elec. Info. Comm./IEICE)
Japanese Society for Biological Sciences in Space (Bio. Space/JSBSS)
The Chemical Society of Japan (Chemistry/CSJ)
Atomic Energy Society of Japan (Atomic Energy/AESJ)
Japan Society for Cell Biology (Cell Biology/JSCB)
The Japanese Society of Plant Physiologists (Plant Physio./JSPP)
The Society of Japanese Women Scientists (Women Scientists, or SJWS/SJWS)
The Mathematical Society of Japan (Mathematics/MSJ)
The Japanese Biochemical Society (Biochemistry/JBS)
The Biophysical Society of Japan (Biophysics/BSJ)
Physiological Society of Japan (Physiology/PSJ)
Protein Science Society of Japan (Protein Sci./PSSJ)
Astronomical Society of Japan (Astronomy/ASJ)
The Zoological Society of Japan (Zoology/ZSJ)
The Japanese Society of Developmental Biologists (Develop. Bio./JSDB)
The Japan Society for Comparative Endocrinology (Comp. Endocr./JSCE)
The Physical Society of Japan (Physics/JPS)
The Molecular Biology Society of Japan (Mol. Biology/MBSJ)

Observers (Name, [label used in the report/official abbreviation])

The Institute of Image Information and Television Engineers (Image Info. Tv/ITE)
Society of Automotive Engineers in Japan, Inc. (Automo. Eng./JSAE)
The Japanese Geotechnical Society (Geotech./JGS)
Information Processing Society of Japan (Info. Process./IPS)
The Illuminating Engineering Institute (Illum. Eng./IEIJ)
The Japan Society for Precision Engineering (Precision Eng./JSPE)
Society of Geomagnetism and Earth, Planetary and Space Sciences (Earth Space, or SGEPSS/SGEPSS)
The Electrochemical Society of Japan (Electrochem./ECSJ)
Japanese Liquid Crystal Society (Liq. Crystal/JLCS)
The Magnetics Society of Japan (Magnetics/MSJ)
Japan Association for Fire Science and Engineering (Fire Sci. Eng./JAFSE)
The Japan Society of Mechanical Engineering (Mechanic. Eng./JSME)
The Japan Institute of Metal (Metal/JIM)
Architectural Institute of Japan (Architecture/AIJ)
Japanese Women Engineers Forum (Women Engineer, or JWEF/JWEF)
The Iron and Steel Institute of Japan (Iron Steel/ISIJ)
The Japan Society for Analytical Chemistry (Anal. Chem./JSAC)

Guest Collaborator (Name, [label used in the report/official abbreviation])

Japanese Society for Mathematical Biology (Math. Bio./JSMB)

In the analysis of the questionnaire response, the above-mentioned academic societies are classified into the following seven academic fields.

Mathematics field
Mathematics

Electronics and information field
Elec. Info. Comm., Image Info. Tv, Info. Process., Illum. Eng.

Physics field
Appl. Phys., Atomic Energy, Astronomy, Physics, Magnetics, SGEPSS

Chemical and material engineering field
Chem. Eng., Polymer Sci., Chemistry, Electrochem., Liq. Crystal, Fire Sci. Eng., Metal, Iron Steel, Anal. Chem.

Life science and biology field
Bio. Space, Cell Biology, Plant Physio., Biochemistry, Biophysics, Physiology, Protein Sci., Zoology, Develop. Bio., Comp. Endocr., Mol. Biology, Math. Bio.

Civil engineering field
Geotech., Architecture

Mechanical engineering field
Automo. Eng., Precision Eng., Mechanic. Eng.

Additionally, the academic societies are classified by the ratio of woman respondent in a part of the question as follows.

Academic societies of which the woman respondent ratio is high (over 24 %)
Illum. Eng., Biochemistry, Plant Physio., Zoology, Mol. Biology, Develop. Bio., Cell Biology, SJWS, JWEF

Academic societies of which the woman respondent ratio is medium (10–24 %)
Mathematics, Info. Process., Physics, Astronomy, SGEPSS, Chemistry, Electrochem., Polymer Sci., Anal. Chem., Iron Steel, Liq. Crystal, Bio. Space, Biophysics, Protein Sci., Physiology, Comp. Endocr., Math. Bio., Architecture

Academic societies of which the woman respondent ratio is low (less than 10 %)
Elec. Info. Comm., Image Info. Tv, Atomic Energy, Appl. Phys., Chem. Eng., Metal, Fire Sci. Eng., Geotech., Automo. Eng., Precision Eng., Mechanic. Eng., Magnetics

A3. Basic Statistics by Association

Table. 4.1 Respondents by Gender and Association

Association	Number of Respondents	Respondents by Gender			% of Female Respondents (A)	% of Female Members (B)	A/B
		Male	Female	N/A			
Total	19291	16140	3104	47	16.1		
Mathematics	502	440	60	2	12.0	5	2.4
Elec. Info. Comm.	2274	2056	212	6	9.3	2.3	4.0
Info. Process	659	547	110	2	16.7	4	4.2
Image Info. Tv	291	267	23	1	7.9	1.7	4.6
Illum. Eng.	67	49	18	0	26.9	14.3	1.9
Physiics	2492	2234	252	6	10.1	4.5	2.2
Atomic Energy	402	372	30	0	7.5	2.3	3.3
Astronomy	259	211	46	2	17.9	7.3	2.5
Appl. Phys.	3068	2817	244	7	8.0		
Magnetics	282	264	18	0	6.4	3	2.1
SGEPSS	107	86	21	0	19.6		
Chemistry	1932	1638	293	1	15.2	8.4	1.8
Chem. Eng.	842	804	35	3	4.2	3.8	1.1
Electrochem.	205	174	31	0	15.1		
Polymer Sci.	447	382	63	2	14.2	7.1	2.0
Anal. Chem.	178	142	36	0	20.2	10.5	1.9
Iron Steel	161	142	19	0	11.8	1.1	10.7
Liq. Crystal	69	61	8	0	11.6		
Metal	271	245	25	1	9.3		
Fire Sci. Eng.	49	48	1	0	2.0		
Bio. Space	48	39	9	0	18.8	12.8	1.5
Biochemistry	1329	998	329	2	24.8	19.6	1.3
Plant Physio.	499	354	145	0	29.1	18.7	1.6
Biophysics	822	676	145	1	17.7	14	1.3
Protein Sci.	322	267	54	1	16.8		
Physiology	370	288	82	0	22.2	14.2	1.6
Comp. Endocr.	175	140	35	0	20.0	14.9	1.3
Zoology	584	427	155	2	26.6	20.2	1.3
Mol. Biology	2878	2079	795	4	27.7	20.1	1.4
Develop. Bio.	480	339	139	2	29.1	12.9	2.3
Cell Biology	330	229	100	1	30.4	19.3	1.6
Math. Bio.	20	18	2	0	10.0		
Geotech.	455	427	28	0	6.2	1.5	4.1
Architechture	2204	1872	327	5	14.9	9.2	1.6
Automo. Eng.	159	153	6	0	3.8	0.6	6.3
Precision Eng.	130	123	6	1	4.7		
Mechanic. Eng.	1172	1099	69	4	5.9	1	5.9
Women Scientists	48	2	46	0	95.8		
Women Engineers	33	3	30	0	90.9		
Others	5072	4124	938	10	18.5		

Table. 4.2 Respondents by Affiliation and Association

Association	Total	Affiliation							
		Corpo-ration	National Univ.	Public Univ.	Private Univ.	Other Edu. Inst.	Public Res. Inst.	Others	N/A
Total	19291	6944	5904	604	2412	249	2113	933	132
Mathematics	502	7	258	34	152	19	7	19	6
Physics	2492	453	1035	73	374	43	387	111	16
Atomic Energy	402	160	77	2	15	0	118	27	3
Astronomy	259	12	121	7	28	4	71	13	3
Bio. Space	48	2	26	4	6	0	7	2	1
Appl. Phys.	3068	1494	739	75	307	43	292	99	19
Magnetics	282	139	75	3	24	7	25	9	0
Elec. Info. Comm.	2274	1225	466	63	283	35	113	81	8
Info. Process	659	220	185	37	148	9	30	26	4
Chemistry	1932	577	724	60	232	37	220	73	9
Chem. Eng.	842	442	212	10	52	10	57	48	11
Electrochem.	205	63	85	5	21	0	27	4	0
Polymer Sci.	447	138	161	9	61	2	63	11	2
Anal. Chem.	178	51	54	7	23	1	34	6	2
Biochemistry	1329	120	609	77	280	3	201	36	3
Plant Physio.	499	22	253	31	48	0	136	7	2
Biophysics	822	75	379	50	134	10	148	23	3
Protein Sci.	322	36	159	23	40	0	58	5	1
Physiology	370	12	171	41	107	4	25	7	3
Comp. Endocr.	175	9	77	7	58	0	18	6	0
Zoology	584	21	289	41	124	2	86	20	1
Mol. Biology	2878	289	1336	120	417	3	606	96	11
Develop. Bio.	480	15	247	23	72	0	93	29	1
Cell Biology	330	13	177	16	46	0	67	10	1
Geotech.	455	349	46	4	18	3	11	21	3
Image Info. Tv	291	165	45	9	34	4	15	17	2
Automo. Eng.	159	126	5	2	7	1	4	14	0
Illum. Eng.	67	13	13	3	23	3	2	10	0
Precision Eng.	130	46	34	2	21	3	18	6	0
Mechanic. Eng.	1172	674	207	25	96	20	69	67	14
Architecture	2204	1242	262	46	264	42	70	255	23
Iron Steel	161	63	50	4	10	1	23	8	2
Liq. Crystal	69	20	22	4	13	3	6	1	0
Women Scientists	48	3	8	4	16	0	10	6	1
Women Engineers	33	16	3	0	7	0	3	4	0
SGEPSS	107	0	53	4	14	0	33	2	1
Metal	271	64	127	5	14	2	51	8	0
Fire Sci. Eng.	49	21	4	0	7	0	10	7	0
Math. Bio.	20	1	11	2	4	0	2	0	0
Others	5072	1489	1614	182	731	60	691	277	28

Table. 4.3 Respondents by Age and Association

Association	Total	Age									
		Under 25	25–29	30–34	35–39	40–44	45–49	50–54	55–59	Over 60	N/A
Total	19291	1093	2490	3196	3174	2774	2016	1643	1430	1455	20
Mathematics	502	6	29	60	63	61	69	59	80	74	1
Physics	2492	27	283	455	449	342	230	204	207	290	5
Atomic Energy	402	2	23	43	50	68	50	54	58	53	1
Astronomy	259	7	46	63	44	33	23	14	12	17	0
Bio. Space	48	2	0	3	4	4	10	10	6	9	0
Appl. Phys.	3068	212	352	406	516	552	321	246	232	227	4
Magnetics	282	6	24	36	52	55	30	24	29	26	0
Elec. Info. Comm.	2274	97	238	355	417	396	252	191	167	158	3
Info. Process	659	22	69	106	118	97	76	54	54	61	2
Chemistry	1932	121	206	292	322	297	192	167	144	188	3
Chem. Eng.	842	31	79	139	113	109	106	80	67	116	2
Electrochem.	205	11	17	30	43	30	25	18	19	11	1
Polymer Sci.	447	14	36	71	80	74	61	37	25	47	2
Anal. Chem.	178	2	10	22	29	33	25	23	21	13	0
Biochemistry	1329	28	126	191	268	215	166	138	105	92	0
Plant Physio.	499	16	89	101	106	68	45	28	24	22	0
Biophysics	822	43	101	138	146	101	71	72	75	74	1
Protein Sci.	322	9	58	51	68	39	31	32	18	16	0
Physiology	370	4	12	49	41	52	63	60	42	47	0
Comp. Endocr.	175	14	23	24	21	17	18	18	20	20	0
Zoology	584	22	70	106	81	73	62	58	56	56	0
Mol. Biology	2878	169	502	616	559	433	270	160	94	75	0
Develop. Bio.	480	8	76	102	88	72	44	40	25	25	0
Cell Biology	330	4	33	52	64	50	42	33	31	21	0
Geotech.	455	4	24	58	63	78	80	71	45	32	0
Image Info. Tv	291	9	21	32	43	52	40	33	27	32	2
Automo. Eng.	159	2	4	9	20	36	31	19	22	16	0
Illum. Eng.	67	0	4	8	12	8	10	7	5	13	0
Precision Eng.	130	2	11	13	18	19	16	15	22	14	0
Mechanic. Eng.	1172	57	107	120	174	172	138	130	130	144	0
Architecture	2204	126	237	299	312	277	258	257	245	193	0
Iron Steel	161	1	11	14	31	26	24	16	18	20	0
Liq. Crystal	69	4	3	11	16	5	8	10	3	8	1
Women Scientists	48	0	0	2	5	8	6	5	10	12	0
Women Engineers	33	0	0	3	8	9	2	2	6	3	0
SGEPSS	107	1	9	25	24	13	8	6	10	11	0
Metal	271	7	22	45	47	47	30	24	26	23	0
Fire Sci. Eng.	49	1	3	8	5	6	7	7	8	4	0
Math. Bio.	20	0	2	4	2	3	3	4	0	2	0
Others	5072	115	457	781	910	782	647	490	432	450	8