Chapter 3 S&T System Reform

Section 1 Fostering, Securing, and Activating Human Resources

1 Establishing an Environment that Enables Individuals to Play Active Roles

In order for Japan to exhibit full capabilities and to continue to grow in the field of world class S&T, it is essential to foster and secure outstanding personnel. It is also important to cultivate an environment that enables a diverse pool of individuals, including young researchers, female researchers and foreign researchers, to become highly motivated and exercise their capabilities. Described below are the outlines of major policies adopted by ministries and agencies as categorized by purposes.

(1) Supporting the self-sufficiency of young researchers

In order for Japan to aim towards becoming an advanced science- and technology-oriented nation, it is critical to foster and secure distinguished and creative young researchers capable of leading future research activities. To this end, it is necessary to develop an environment for young researchers to conduct their research self-sufficiently, to provide sufficient research funds, and to increase the available positions such as assistant researcher and associate professor where the researchers can foresee a career path, by providing opportunities for research activities and promote young researcher's self-sufficiency.

In relation to the Grants-in-Aid for Scientific Research, MEXT appropriate approximately 33.1 billion yen in 2010, in an attempt to enhance "Grant-in-Aid for Young Scientists," which is to provide research items aimed at to support young researchers, for young researchers with little experience to acquire research funds and to make a good start.

In addition, to promote the activities of the young researchers, MEXT has implemented the Special Coordination Funds for Promoting S&T "Improvement of Research Environment for Young Researchers," and as of FY 2010, MEXT is supporting by developing research environment, providing start-up funds, securing research space and introducing the tenure track system[1] in 40 institutions.

Furthermore, JSPS operates "Research Fellowships for Young Scientists" in order to provide excellent young researchers with opportunities to devote themselves to their research activities and independently choose topics without restriction. It also implements programs for overseas dispatch of young researchers, such as "Postdoctoral Fellowships for Research Abroad" and "Young Researcher Overseas Visit Program for Vitalizing Brain Circulation," which provide opportunities for them to improve themselves by competing with foreign researchers and to turn their eyes on international issues. These programs seek to foster and secure highly capable young researchers with wide international perspectives who will go on to play leading roles in the international science and academic communities and forge the future of academia in Japan.

1 System where young researchers employed through fair and highly transparent selection process and able to gain experience as an independent researcher having an employment condition such as having a specific period of employment before getting a more stable profession after a review.

In order to foster next-generation researchers in the field of information and communications technologies (ICT), MIC implements R&D through the Fostering Young ICT Researchers [literal translation] as part of the Strategic Information and Communications R&D Promotion Program (SCOPE), providing research funds for R&D projects proposed by young researchers.

In order to foster young researchers who will conduct the Health, Labor, and Welfare related research activities in future, MHLW invites applications for funding under projects funded by the Health and Labour Sciences Research Grants.

As a means of motivating young researchers, MAFF establishes an award as part of its Human Resources Development Program in Agriculture, Forestry and Fisheries Research [literal translation] to recognize researchers under 40 years of age who have achieved excellent results.

Meanwhile, "Basic Research Promotion Program for Creation of Innovation" implemented by the National Agriculture and Food Research Organization provides a special category in competitive funding to support young researchers develop technical seeds. The National Institute of Agrobiological Sciences promotes the self-sufficiency and enhancement of young researchers' motivation through a junior researcher system, which allows graduate school students to be enrolled in doctoral programs while working for the institute.

METI, through NEDO, provides subsidies for young researchers' R&D activities aiming at industrial applications.

In order to promote research by young researchers, MOE sets up a special reserve within the ministry's competitive funds to support young researchers.

SCJ is not just looking at the young researchers as a subject of support, but it recognizes the importance of their active opinion delivery and involvement in various issues around S&T. Therfore, SCJ is considering how to achieve them and aims to organize independent academy activity by young researchers.

(2) Promotion of the activities by female researchers

The ratio of female researchers in Japan is lower than that of European countries and the U.S. Promotion of female researchers is extremely important not only because of the gender equality, but it is also important in order to incorporate diverse ideas and perspectives, vitalize research activities, show creativity as an organization.

The 3rd Basic Plan calls for a variety of initiatives to promote activities by female researchers. In response to this, since FY 2006, JSPS's "Research Fellowships for Young Scientists" allow excellent female researchers with parental leave to return to research smoothly.

Moreover, MEXT implemented a "Supporting Activities for Female Researchers", which is funded by the Special Coordination Funds for Promoting Science and Technology, that supports environmental improvement in the research institutions such as universities, to encourage female researchers to pursue their careers while raising children in 35 organizations as of FY 2010.

Since FY 2009, the "Program to accelerate female researcher training system reform [literal translation]Supporting Positive Activities for Female Researchers" funded by the Special Coordination Funds for Promoting Science and Technology, the research institutions that supports employment of female researchers, such as universities, especially in the areas of sciences, agricultural sciences, and engineering where the percentage of female employees is low and as of FY 2010, 12 organizations are

implementing this program.

JST Basic Research Programs establish and support a system that enables researchers to postpone their research activities for parental leave or to return from their leaves.

Furthermore, JST implements a project to encourage female students of lower and upper secondary schools to follow science career paths by creating opportunities for them to mingle with female researchers and by providing courses as a way to foster their interest in S&T.

Under the slogan "Challenge Champaign: Choice of S&E Courses for Female Students [literal translation]," the Cabinet Office provides them with information related to S&E to raise their awareness about this area.

AIST has established promotional plans to gender-equal participation in the 3rd mid-term plan period (FY 2010-FY2014). Encouraging seminars, recruitment seminars for female students are conducted. And also, in order to improve the work environment, it extended child care vocation system until the child enters elementary school and established a vocation system for nursing. Therefore, measures for the support of the simultaneous pursuit of nursing/child care and business are reinforced. In addition, within the consortium activities consisting of universities and research institutions, it jointly promoted the improvement of work environment, career building and motivation of female researchers.

(3) Promotion of the activities by foreign researchers

In addition to securing competent human resources, it is important to prepare an environment that allows talented researchers from other countries to live and work, from the perspective of improving the research level and international nature of research activity in Japan,

However, the percentage of foreign nationals among highly skilled workers in general is extremely low in Japan as compared to international levels. Japan hosts about 11,000[1] foreign researchers, accounting for only 1.34% of the total number of researchers in the country.

The acquisition of talented researchers is currently the focus of fierce international competition among the U.S., European countries, and China under the era of competition around "knowledge." In order to attract excellent foreign researchers, the Japanese government has reformed its immigration control system in 2006 as to expand the special measure allowing foreign researchers to stay in Japan from the original three years to up to five, an extension that was previously applied only to designated structural reform districts where programs for the promotion of receiving foreign researchers were in place. JSPS is implementing invitational programs, such as "Postdoctoral Fellowships for Foreign Researchers" and "Invitation Fellowships for Research in Japan", which annually invites approximately 6,100 excellent foreign researchers to Japan.

2 Strengthening the Human Resource Development Function of Universities

(1) Human resource development at universities

Universities, essential institutions for the creation and utilization of knowledge, have a large role to play in fostering competent human resources endowed with the creativity, broad perspective and flexible

1 Statistical figures where residence of status of resident is either "Professor" or "Researcher" shown in "Foreign Resident Statistics" published by Ministry of Justice.

thinking necessary for exercising leadership across borders. Universities are actively working to improve education for this purpose. For example, the number of universities introducing major-minor systems that enable students to systematically study in a broad range of fields has been increased over the past few years, with 167 universities (undergraduate level) and 106 universities (graduate level) adopted this system as of FY 2008. Furthermore, in order to improve and enhance the education environment, 727 universities executed organizational efforts to improve the educational strengths of faculties (faculty development) in FY 2008, and 341 universities (undergraduate level) and 250 universities (graduate level) executed educational performance evaluations for faculties in the same year.

MEXT provides support to excellent efforts by national, public and private universities to reform university education in order to promote the implementation of education and research that reflect their own characteristics.

(2) Drastic enhancement of graduate school education

In a modern society in which specialization and segmentation of knowledge is progressing and international competition is intensifying, there is a pressing need to foster competent human resources equipped with both deep expertise and broad versatility that can adapt to new academic fields and rapid technological innovations. With regard to graduate schools, which should play a central role in the development of such human resources, quantitative improvement has steadily progressed with the number of graduate school students rising by about 70,000 over the 10-year period between FYs 1999 and 2008. From now, it is necessary to further improve the quality of education at graduate schools.

In this context, it is important to have graduate schools clarify the objectives of their curriculums while taking social needs into account and, based on such definitions, enhancement and reinforcement of graduate school education (enhancement of systematic development) in such a direction that systematic education programs leading to degrees should be created and offered, and that management and transparency of the processes should be diligently pursued. MEXT has implemented the "Organizational Support Program for Improving Graduate School Education" that supports excellent organizational and systematic educational projects in graduate schools for developing high-level personnel who can take an active role in a variety of different fields of society including industry. As of FY 2008, MEXT had adopted 221 programs proposed by 91 universities. In addition, in FY 2010, a post-evaluation was executed at the 125 programs adopted in FY 2007.

(3) Drafting of initiatives related to the reform of graduate school education

MEXT formulated the Platform for the Promotion of Graduate School Education which features systematic and intensive efforts towards enhancing graduate schools over a five-year period in March 2006. This sets the direction of reform towards 1) realization of effective graduate school education, 2) assurance of conformity to international standards and credibility and 3) establishment of education and outstanding research centers that are competitive internationally. MEXT has implemented measures for making Japanese graduate schools attractive across borders based on this platform.

In January 2011, the Central Council for Education released the report, "Graduate School Education in a Globalizing Society", where 1.Provide systematic education of graduate school, as degree programs, and 2.Foster doctors to play an active role globally are pillars of this report.

(4) Expansion of financial support for doctoral students

In order to secure excellent researchers, it is necessary to encourage talented students to proceed to doctoral courses and to provide them with financial support. Therefore, the 3rd Basic Plan aims to enable about 20% of doctoral students to receive financial support equivalent in amount to their living expenses.

To this end, MEXT enhanced, as a priority, support for doctoral students that is provided through the "JSPS Research Fellowship for Young Scientists" and expanded the amount of competitive funds that can be used to appoint students as teaching assistants (TA), which lets graduate students assist educational activities, and as research assistants (RA), which allows doctoral students to participate in research projects conducted by universities. The "JST Basic Research Programs" also has been supporting the employment of excellent doctoral students as RAs.

The Japan Student Services Organization implemented loan programs for those who have ability but are not possible to go to school due to economic reasons, and exemption of repayment for those who achieved especially outstanding results.

3 Development of Human Resources that Meet Social Needs

(1) Nurturing competent human resources through industry-academia collaboration

For Japan to maintain its prowess in industrial technologies and achieve sustainable development, it is important to develop, by taking account of the needs of the society including the industrial sector, competent persons that meet such needs and that can adapt to change in the needs. To do so, it is essential for universities, companies, and other actors to construct cooperative relationship to work together.

Therefore, MEXT and METI are promoting the "Industry-Academia Collaboration for Fostering Competent Human Resources [literal translation]" to provide opportunities to communicate and carry out the activities in relation to human resources between universities and industries, and implemented the "Career Development Program for Foreign Students from Asia" to attract excellent foreign students from Asian countries to Japan and promotes their activities within Japanese corporations.

MEXT promotes development of human resources through industry-academia collaboration at universities, by the Support Program for Fostering Manufacturing Engineers [literal translation], which supports fostering of engineers involved in manufacturing through cooperation of regional communities and industries, and the Program for Service Innovation Human Resource Development, which cultivate competent human resources contribute to creation of innovations through improvement in service productivity.

MEXT implemented the Strategic Program for Fostering Environmental Leaders under the Special Coordination Funds for Promoting Science and Technology, in order to establish centers at which foreign students from Asian and other countries can study together with Japanese students so that competent persons who have the leadership potential to solve environmental problems in developing countries (called environmental leaders) can be fostered. At present, project is going on in 12 organizations.

MOE has been implementing the project to establish an industry-academia-government collaboration, "Environmental Consortium for Leadership Development (EcoLeaD)," based on the "Vision of University-led Environmental Leadership Initiatives for Asian Sustainability," which was set forth in March 2008, to train people (green human resource) to work on socio-economic green actively.

METI supports the program for fostering competent human resources through industry-academia