

Section 3 The Desired Human Resource System

1 Reform of the Human Resource System

To strongly promote science, technology and innovation in Japan, a new human resource system must be built by reforming the conventional Japanese system. Based on Sections 1 and 2, the following explains what is required for such a new system.

(1) Building a system of highly mobile human resources

The number of young Japanese has been declining as result of low birthrates and demographic aging. Competition in brain gain has been intensifying. Increasing the pool of human resources for science, technology and innovation while maintaining quality, is expected to be more difficult if Japan continues to rely on the conventional human resource system.

Under such circumstances, to enhance the human resources of Japan, it is necessary to do the following: increase the motivation researchers, enable them to pursue new endeavors and maximize the potential of human resources. These are achieved by fairly and objectively evaluating their abilities and achievements and by treating them according to such evaluations.

However, treating researchers in this manner is difficult considering the present circumstances of universities and public research institutions, “a generation gap in mobility” exist. Researchers who have been performing poorly in their present posts are not given new opportunities under which to apply their abilities. Young researchers, in particular, are not given appropriate positions even when they show great potential. It is necessary to plan for enhancing the research potential of researchers as a whole by eliminating “a generation gap in mobility” and improving the mobility of all researchers, and to plan for the creation of an environment in which the researchers are able to find positions that suit their abilities.

In this knowledge-based society, it has become increasingly important to promote active participation by human resources who possess highly specialized knowledge and to promote the high mobility of researchers across various research fields based on changes in the needs of society and industry. In light of this, it is also necessary to expand the career opportunities of highly specialized human resources so that they may fully apply their abilities and to plan for raising the level of human resources as a whole in society, while striving to achieve mobility for human resources. This can be done by diversifying career paths for doctoral graduates and by enhancing adult education in terms of quality and opportunity.

We are currently in the situation in which the needs of citizens and society have diversified and various activities are undertaken across borders because of globalization. To address the various issues by applying science, technology and innovation, it is necessary for young researchers to have experience in diverse institutions and cultures, and to attain the abilities that enable them to flexibly take in various viewpoints and ideas. Human resources, which play the main role in science, technology and innovation, need experience with diverse organizations and cultures as young researchers. In summary, the mobility of human resources needs to be increased.

(2) Improvement of the research environment so that diverse human resources can play active roles

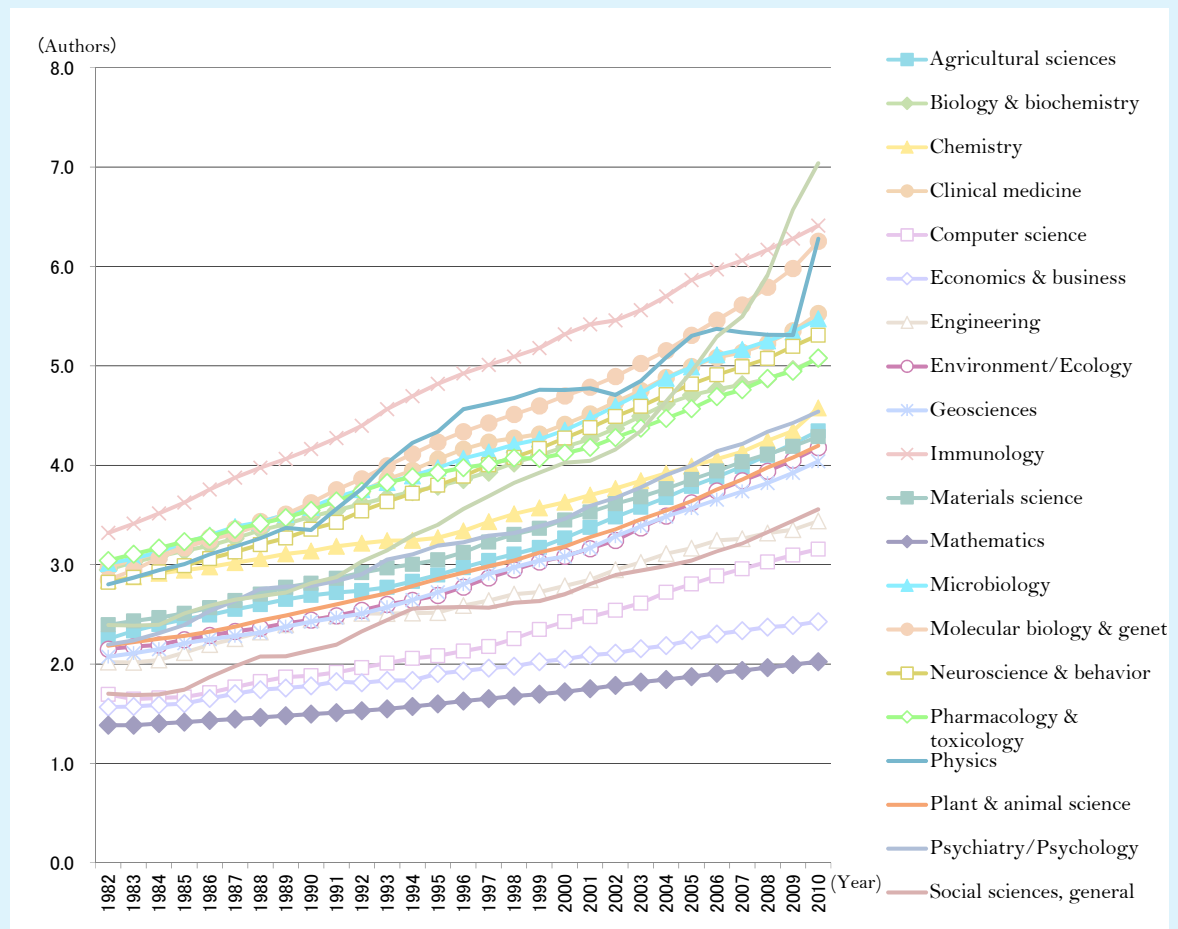
For S&T to address various issues amidst various socioeconomic changes, there is the need for diverse human resources with varied knowledge, viewpoints and ideas. The pool of human resources for science, technology and innovation has stopped growing. It is vital to maximize the potential of such resources by improving their mobility. In addition, it is also vital to enhance human resources by utilizing women researchers, young researchers and non-Japanese researchers, whose abilities have not been fully utilized due to various restrictions. It is an urgent task to provide researchers with the necessary support and to develop environments where they are able to play active roles irrespective of gender, age and nationality. Such environments will make it possible to secure diverse human resources.

To enhance science, technology and innovation activities under increasingly intensifying internationalization in S&T activities, it is indispensable to build and utilize international research networks. Based on the previously mentioned viewpoint, the enhancement efforts include the provision of opportunities for young researchers to study abroad and optimizing conditions for accepting non-Japanese researchers is necessary to develop research environments where human resources are able to fully exert their abilities.

(3) Building platforms for the co-creation of new knowledge and value

With changes in socioeconomic conditions, the way for the creation of new knowledge and value has been changing. The ability of an individual is not sufficient for innovation, and teamwork has become more and more important (Figure 1-1-49). It is crucial that researchers with diverse knowledge, viewpoints and ideas to work as a team, stimulating each other in order to bring forth a fusion of knowledge, viewpoints and ideas.

Figure 1-1-49 / Changes in the Average Number of Authors per Scientific Paper



Source: Adopted by the National Institute of Science and Technology Policy (NISTEP) from *Web of Science*, Thomson Reuters (SCIE, CPCI: Science, as of Dec. 2011).

Note: Articles, articles and proceedings, letters, notes and reviews are counted. Data by year. 3-year moving average

Source: NISTEP, *Participations and Contributions of Young Scholars in Scientific Research*, Nov. 2013.

However, the enhancement of such approaches in Japan falls behind that in other advanced nations, because mobility among sectors is low and the utilization of various human resources is insufficient. Despite worldwide progress in open innovation, companies in Japan still rely on their own R&D for most of their technologies. Breaking away from the so-called “in-house policy“ has not seen any progress (Figure 1-1-50).

Therefore, after building a system of highly mobile human resources and enhancing an environment in which diverse human resources are able to take active roles, it is important to concentrate the abilities of team members and to develop platforms for the co-creation of new knowledge and value. These new opportunities will help to promote the creation of research outcomes that surpass those done individually.

To provide such platforms, several initiatives have been initiated, including the Tsukuba Innovation Arena, the World Premier International Research Center Initiative (WPI) and the Center of Innovation (COI). It is necessary to promote wide provisions of opportunity for collaborative creation by realizing a hub function for the research and development (R&D) institute system, which will be formulated in the near future.

2 Initiatives toward the Promotion of Fair and Honest Research Activities

(1) On research misconduct

Research activities are based on achievements by predecessors. Researchers study and make investigations based on the facts and data obtained in observations and experiments. The development of new knowledge and the systematization of knowledge through these activities are what research is about.

Research misconduct, which distorts the essential quality and purpose of research activities, is an unforgivable act that undermines trust in science. Problems of research misconduct have surfaced recently (see the references below). To foster a sense of ethics among those who are involved in research, including students and young researchers, as well as to promote fair research activities, it is important to strive to gain society's trust in science by strengthening efforts to prevent research misconduct.

Reference: Examples of recently disclosed research misconduct

(FY2012)

- Questions were raised about the blood pressure data in research papers on Valsartan, a drug for treating high blood pressure produced by Novartis Pharma K.K. Related papers were withdrawn from academic journals.
- Doubts were raised about the correctness of papers written by a group of authors that included a former professor at the Institute of Molecular and Cellular Biosciences of The University of Tokyo. The University of Tokyo identified 51 papers in which scientifically inappropriate images were used. The university is continuing its investigation.

(FY2013)

- It was pointed out that papers on "stimulus-triggered acquisition of pluripotency" (STAP) cells contained some controversial points, and an investigation committee of RIKEN recognized that there were falsifications and fabrications in parts of the papers.

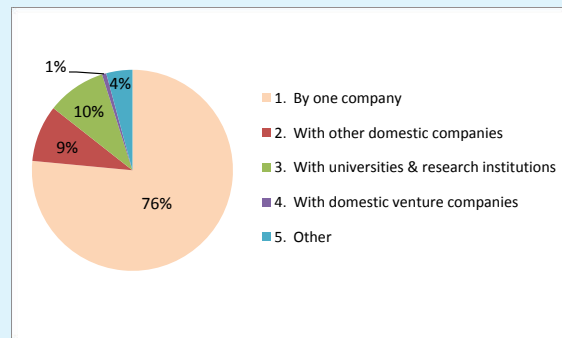
Note 1: The year is that in which the media publicized allegations of misconduct.

Note 2: These are only major examples. The list is not comprehensive.

(2) Approaches toward the promotion of honest research

The problems of research misconduct are mainly the problems of individual researchers, institutions including universities, and the academic community. In conducting research, individual researchers must exercise self-discipline. An environment that prompts misconduct has to be reformed and controlled by research institutions and the academic community. The Science Council of Japan, as the representative organization of the research community, has been taking initiatives toward improving the integrity of

Figure 1-1-50 / Breakdown of R&D Projects by Participant



Source: METI, *Survey on Medium- to Long-term R&D which Contributes to Creation of Innovations by Japanese Companies*, Feb. 2012

scientific studies. In December 2013, the council published the proposal, *Prevention Measures for Misconduct in Research Activities and After Care -- Toward Improvement of Integrity of Science*. Based on the proposal, the council, together with related organizations, is working to create a program for research ethics education.

MEXT published a mid-term report at a meeting of The Task Force for Misconduct in Research and Unauthorized Use of Research Funds, in September 2012. The ministry examined the issue in its' experts' council in collaboration with the Science Council of Japan. Issues related to research misconduct have generally been left to individual researchers and they have been expected to address such issues on their own initiative. To improve on this issue, the government will provide support so that organizations that employ researchers will be able to take the initiative in addressing these issues. With a view to promoting approaches to prevent research misconduct, the government will review the guidelines for unauthorized use of research funds and research misconduct, as well as improve research ethics education for researchers and related personnel.

To combat the unauthorized use of research funds, the revised proposal for the Guidelines of Management and Audit of Public Research Funds in Research Institutes (Implementation standards) was approved by the minister of MEXT in February 2014, and the new guideline took effect in April.

Based on the summary report of the cooperators' meeting for reviewing and improving uses of *The Guideline for Misconduct in Research Activities* in February 2014, examinations have been made by MEXT toward reviewing the current guidelines.

To foster research ethics in persons recognized as researchers, including graduate students, support for the Collaborative Institutional Training Initiative (CITI) Japan Project¹, which has been developing research ethics education programs, will be continued.

These initiatives will be promoted by the dissemination of reviewed guideline standards and requests for the thorough implementation of the standards. This will lead to the development of systems that enable research institutions to consistently take measures to prevent and handle misconduct, and it will promote fair, honest research activities among researchers.

The Council for Science and Technology Policy² has been examining measures against research misconduct, based on opinions presented by member experts at its meeting in April 2012.

All divisions of government will continue to promote approaches for fostering young researchers and encouraging their activities, so that each researcher can develop a high ethical standard, show total dedication to research and achieve excellent research results.

¹ The CITI Japan Project enjoys the participation of six universities, including Shinshu University. It aims to develop research ethics education programs and materials for e-learning that satisfy international standards and that suit the conditions of the Japanese research environment. The program is based on the international CITI program that has been promoted in the U.S. and other countries. This project was selected as a FY2012 Program for Promoting Inter-University Collaborative Education. Support will be provided for the five years from 2012 to 2016.

² *The Act for Partial Revision of the Act for Establishment of Cabinet Office* came into force on May 19th, 2014, and the Council for Science and Technology Policy was reorganized into the Council for Science, Technology and Innovation.