Chapter 5 Development and Promotion of Policy in Collaboration with Society

Section 1 Deepening Relations between Society and Science, Technology and Innovation

While recent progress in science and technology (S&T) has raised public expectations, the Great East Japan Earthquake and the accident at the Tokyo Electric Power Company, Incorporated Fukushima Daiichi Nuclear Power Station have revealed insufficient risk management and increased anxiety and distrust of the general public with regard to S&T. On planning and conducting science, technology and innovation (STI) policies, it is important that the government, in collaboration with researchers, engineers and research institutions, gain the understanding, trust and support of citizens. The government should carefully consider the expectations and anxieties of society and explain the possibilities, risks and costs of S&T to the general public. Thus, the government is making efforts to promote S&T communication activities, including risk communication and public participation in the policy process in order to strengthen the relationship between society and STI.

1 Promotion of STI Policies from the Public Viewpoint

(1) Further involvement of the public in policy planning and promotion

When planning and promoting economically and socially valuable STI policies, the government must thoroughly understand the issues and the social needs that are to be addressed, and to appropriately reflect them in policy. It is also important for the government to disseminate these policies to all levels of the general public and to make efforts to strengthen accountability. Accordingly, the government promotes the implementation of public comment procedures and wide involvement of the public in policy planning and promotion.

The government invited stakeholders from wide-ranging industry, academy and government sectors to the 1st Science, Technology and Innovation Policy Forum, held in March 2015 to distribute STI policies promoted by MEXT and discuss the future direction of STI policies.

(2) Response to ethical, legal and social issues

As S&T progresses and becomes more complex and diversified, the public is deeply involved in its ethical, legal and social aspects, such as misconduct in research including fabrication, falsification, or plagiarism of data and problems lying in advanced scientific technologies and bioethics. To cope, the government promotes the following measures:

1) Raising the ethical standard of researchers and engineers

Based on the "Countermeasures against Misconduct in Research Activities by the Competitive Research Fund (September 2005 Agreement in the Liaison Committee of Ministries and Agencies Concerned with Competitive Funding), which stipulates measures taken for research misconduct such as fabrication or plagiarism, MEXT, METI and the other ministries concerned have requested that the related agencies take the necessary actions, including a reception desk to accept accusations of misconduct. The guidelines have

been revised as required according to cases of research misconduct at the time.

While the government has done its utmost to promote STI at full stretch, repeated incidents of research misconduct have emerged. Following a request from Prime Minister Abe to investigate misconduct in research activities by taking the actual research environment sufficiently into consideration and looking at the bigger picture rather than individual cases, the Council for Science, Technology and Innovation called a number of meetings to discuss the issues and transferred its conclusion on the effective measures against research misconduct to related ministers on September 19, 2014. In November, countermeasures against misconduct in research activities were also published on the website of the Cabinet Office (Science and Technology Policy)[1] to disclose wide-ranging information on research misconduct.

The relevant ministries have revised the existing guidelines in sequence according to the latest actions to strengthen preventive measures for misconduct in research activities. MEXT published "Guidelines for Responding to Misconduct in Research" (as approved by the Minister of Education, Culture, Sports, Science and Technology on August 26, 2014) and has continuously supported the development of research ethics education programs (see Feature 2).

2) Efforts in relation to bioethics and safety in life sciences

To adequately deal with problems related to bioethics that could potentially occur as a result of the rapid growth that has occurred in the life sciences recent years, the Council for Science, Technology and Innovation (CSTI) is implementing surveys and studies on important issues. MEXT and MHLW will also review any necessary acts, regulations and guidelines (see Part 1, Chapter 2, Section 3-2,).

(3) Fostering and securing human resources connecting society with STI policies

Human resources who act as liaisons between society and STI play an important role in the government's efforts to implement effective STI policies. The government promotes fostering and securing human resources who play these roles and promotes increasing the number of opportunities for their activities.

1) Science and technology communicators

To promote S&T to the general public, it is necessary to foster and secure "S&T communicators" to bridge the gap between the general public, policy-makers and researchers, as well as to encourage communications between them.

The National Museum of Emerging Science and Innovation, run by the Japan Science and Technology Agency (JST), is working to foster and produce S&T communicators, who work both inside and outside the museum through S&T communication activities such as conducting dialogues with visitors, as well as planning and producing exhibitions and events (see Paragraph 2 of this section).

The National Museum of Nature and Science is also training S&T communicators (see Paragraph 2 of this section).

1 http://www8.cao.go.jp/cstp/fusei/index.html

2) Human resources for research management (research administrators)

Universities and research institutions in Japan have insufficient human resources who are capable of conducting research management, and also understanding the contents of R&D at their specified level. This imposes an excessive burden on researchers because of the additional works they must do in addition to their research activities. To improve this situation, MEXT supports fostering and securing personnel who can conduct research management at universities (University Research Administrator), with the aim of establishing an environment that both activates and enhances research activities as well as R&D management at universities.

(4) Efforts to solve specific problems in society

Optimally exploiting knowledge on both "natural sciences" and "humanities and social sciences", the Research Institute of Science and Technology for Society (RISTEX) of JST promotes problem-solving social technology R&D to feed new R&D outcomes useful for resolving problems back to society in collaboration with "stakeholders" in various positions and familiar with situations and issues in specific places, including researchers at universities and public research institutions as well as local people, NPOs and local governments. The social technology R&D has been conducted in three focus areas, "Designing a Sustainable Society through Inter-generational Co-creation," "Creating Community-based Robust and Resilient Society" and "Redesigning Communities for Aged Society" and in two programs, "Service Science, Solutions and Foundation Integrated Research Program" and the "Science of Science, Technology and Innovation Policy." RISTEX also supports efforts to utilize and develop the outcomes of R&D projects implemented by public R&D funds through the "Implementation-Support Program."

2 Promotion of S&T Communications

In order to create a society in which citizens seem closer to science and technology with a keen interest, the government must provide various opportunities for people to touch, experience and learn science and technology, and exchange opinions by promoting interactive communications between researchers/engineers and society.

(1) Science and technology week

MEXT, in cooperation with other relevant organizations, including experimental research institutions and local authorities, held the 55th "Science and Technology Week" from April 14 to 20, 2014. Various events, including opening of research facilities to the general public, experiments in classrooms,–lectures, and award ceremony for the winners of science and technology awards given by the Minister of Education, Culture, Sports, Science and Technology, took place at organizations across the country. At the same time, "Science Café," where researchers and citizens could talk casually over a cup of coffee was held at the "Joho-Hiroba (Information Plaza) of MEXT."

(2) Enhancement of activities conducted by science museums

JST supports experimental and interactive events and the establishment of networks by science museums, universities, local authorities and volunteer groups, to promote S&T communication activities nationwide for solving issues including social problems and needs. The National Museum of Emerging

Science and Innovation promotes interactive communication between researchers and the general public through the creation and lecture of exhibitions to introduce advanced S&T in an easy-to-understand manner, and also through planning and conducting events. It also encourages collaboration among science museums and schools across the country as the hub of Japan's S&T communication activities.

The National Museum of Nature and Science holds exhibitions that provide opportunities to share the joys of nature and science across generations, allowing them to think together and also provides age-appropriate learning supports by utilizing intellectual, material and human resources, including research results and sample materials accumulated by the national center of natural history and S&T history. The Museum fosters human resources who connect people with S&T, through programs such as the "Science Communicator Training Program." The Museum also encourages scientific experimental study programs developed for schools across the country through events such as the "Museum Open House for Teachers" and through programs to improve the science literacy of everyone according to their generation.

(3) Efforts by research agencies

The Japan Aerospace Exploration Agency (JAXA) provides various educational activities such as "Cosmic Collage" with the aim of getting the young people who will lead the next generation more interested in S&T as a whole and space science in particular.

RIKEN offers various programs to citizens and also conducts outreach activities. For example, RIKEN produces animated films to explain the latest research results and scientific phenomena aimed at high school students. These films are available free online.

The Japan Society for the Promotion of Science (JSPS) cohosted the "Nobel Prize Dialogue Tokyo 2015" with the Nobel Foundation in March 2015, inviting domestic and foreign Nobel laureates for lectures and panel discussions to shorten the distance between academia and society and increase public interest in science. The meeting has been held annually in Sweden since 2012 and Japan is the first foreign country to hold the meeting.

Nobel Prize Dialogue Tokyo 2015
Source: JSPS

MAFF provides producers and consumers with information and opportunities to exchange opinions on the R&D of advanced technology in the fields of agriculture, forestry and fisheries. These R&D-type independent administrative institutions open their facilities to the public and provide lectures throughout the year, helping to raise awareness by facilitating interactive communication with the public about their research activities and by exhibiting research results.

The National Institute of Advanced Industrial Science and Technology (AIST) operates the Science Square Tsukuba/Waterfront and the Geological Museum as permanent exhibition facilities. In 2014, its research facilities were opened to the public in ten locations nationwide. More than 15,000 people visited the research facilities. In addition, with the aim of establishing interactive communication with the public, AIST actively promotes S&T communication programs focusing on dialogue. This is done through events

such as Science Cafés, experimental classrooms and the "AIST Open Laboratory."

Universities and public research institutions make efforts to widely disseminate information on research results to the general public.

The Council for Science, Technology and Innovation (CSTI) summarized a policy for the "Promotion of the 'Dialog on Science and Technology with Citizens' (A Basic Course of Action)" in June 2010. With this policy, CSTI encourages researchers who receive annual public research funds of 30 million yen or more for individual research projects to actively communicate with the public regarding the contents and the results of their research activities.

(Efforts of the Science Council of Japan and academic societies)

The Science Council of Japan (SCJ) holds academic forums as part of its activities to feed outcomes of research back to society. In FY 2014, it held 17 forums on wide-ranging subjects, including the "International Linear Collier (ILC) Program," "Sharing the lessons learned from the past earthquake disasters, such as the 2011 Great East Japan Earthquake and the 1995 Kobe Earthquake disasters" and "Improvements of research integrity - Guidelines for Responding to Misconduct in Research -." It also opened a Science Cafe jointly with MEXT six times in 2014.

The academic societies are voluntary associations organized mainly by researchers in universities and other research institutions. They play an important role for research evaluation, information exchange and communication beyond that of individual research organizations and contribute to the development of academic research through academic research meetings, seminars and symposiums that disseminate the latest results from quality research and academic journals. Through programs such as the "Grants–in-Aid for Publication of Scientific Research Results," MEXT subsidizes international conferences held by academic societies that invite researchers from overseas and holds symposiums to raise awareness of the latest research results, to disseminate those results to children, young people and adults and to improve international information dissemination.

(Promotion of risk communication)

MEXT launched the "Program for Developing Risk Communication Models" based on "The Promotion Strategy for Risk Communication" (March 27, 2014, the Committee for the Science and Technology for Safety and Security and Social Linkage" to promote risk communication by expert groups and organizations to allow experts in various fields to accomplish their responsibility for accountability to society when risks are concerned. It supported three organizations as of FY 2014.

JST started joint research with the Society for Risk Analysis and conducted "Cross-sectoral surveys on the present situations of risk communication study and implementation." It also held the "Science Agora 2014" on November 7 - 9, 2014. It is a compound event to discuss how best to realize a better society through science and technology from many directions and opening workshops.

The Consumer Affairs Agency (CAA), the Food Safety Commission, MHLW and Ministry of Agriculture, Forestry and Fisheries (MAFF) collaboratively conduct risk communication activities for food safety. As a result of the first case of Bovine sponge form encephalopathy (BSE) found in 2001, the 2003 Basic Food Safety Act (No. 48 of 2003) was enacted, making the government responsible for the communication of food safety to the nation. Meetings are held to exchange opinions on a variety of topics,

including the prevention of food poisoning, the safety of imported food products, functional foods, food additives and pesticide residues. In particular, since 2011 and in response to the accident at the Tokyo Electric Power Company (TEPCO) Fukushima Daiichi Nuclear Power Station, active risk communication undertakings have been conducted by opinion exchange meetings with consumer regarding countermeasures against radioactive substances.

Section 2 Promotion of Effective STI Policies

The 4th Basic Plan positioned STI policies as part of its "social and public policies" to promote policy planning based on objective evidence, establishing the plan-do-check-act (PDCA) cycle and reforming R&D systems.

1 Strengthening of Policy Planning and Promotion Function

(1) Undertakings for "Reinforcing headquarter functions of CSTP"

The government submitted a draft of the "Act for Partial Revision of the Cabinet Office Establishment" for modifying the Council for Science and Technology Policy (CSTP) and clerical work at the Cabinet Office to the 186th Diet. The act was passed on April 23, 2014 and enacted on May 19, 2014 (see Section 2, Chapter 1).

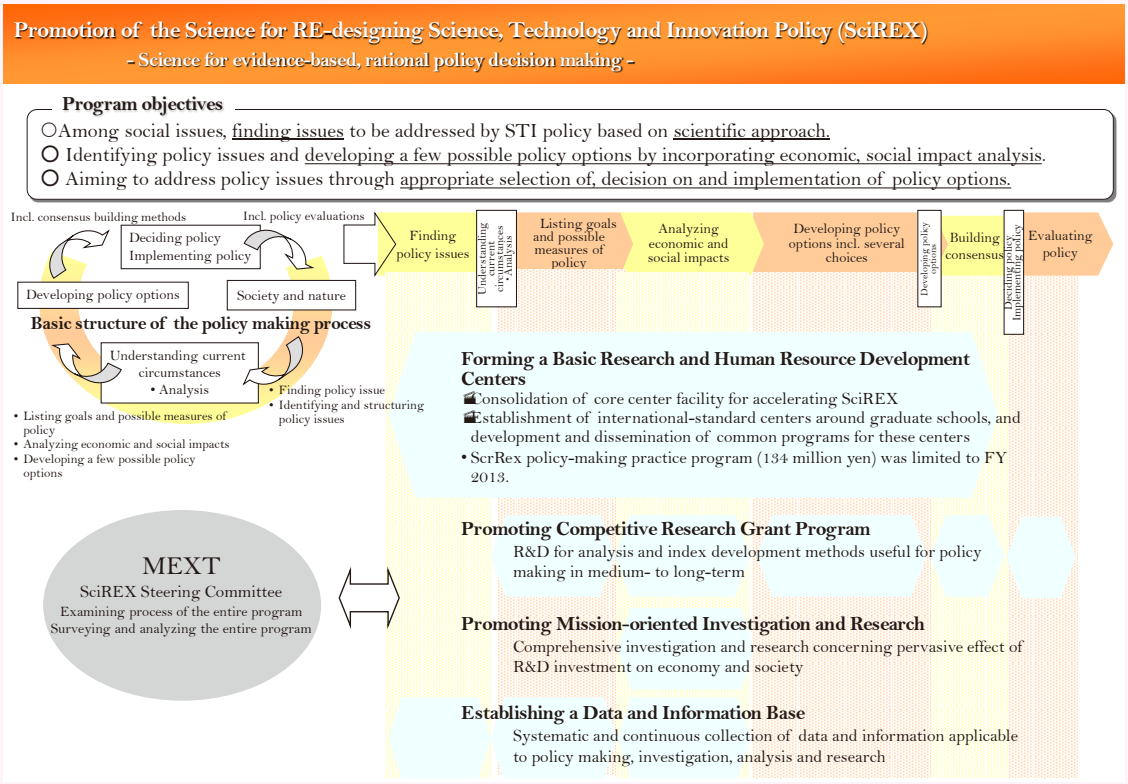
(2) Integrated promotion of social system reforms and R&D

The projects continued across fiscal years by the Strategic Funds for the Promotion of Science and Technology according to the policies determined by the Council for Science, Technology and Innovation (former CSTP) were implemented as programs in the "Integrated promotion of social system reform and R&D" by MEXT from FY 2013 and six programs were implemented in FY 2014.

(3) Science for RE-designing Science, Technology and Innovation Policy: (SciREX) program

MEXT, in cooperation with the National Institute of Science and Technology Policy (NISTEP), the RISTEX of JST and the Center for Research and Development Strategy (CRDS) has implemented the "SciREX" program. This is aimed at facilitating "objective, evidence-based policy-making," in which effective policies are made in response to issues, drawing on a multifaceted grasp and analysis of economic, social and other factors (Figure 2-5-1). MEXT also opens "Science Promotion Committee for STI Policies" for supervising the entire program and making recommendations about how to proceed with projects and similar for integrated promotion of the program.

■ **Figure 2-5-1 / Promotion of SciREX in Science, Technology and Innovation Policies**



Source: Created by MEXT

MEXT supports researchers pursuing "science" to promote STI policies and centers (universities) and foster human resources to implement STI policies in society and connects these centers via a network to establish a system to foster human resources systematically nationwide. In FY 2013, the National Graduate Institute for Policy Studies, University of Tokyo, Hitotsubashi University. Osaka University, Kyoto University and Kyushu University started accepting students in this discipline.

MEXT provided a core center function in August 2014 under the collaboration of the University of Tokyo, Hitotsubashi University, Osaka University, Kyoto University and Kyushu University (domain development center), centering on the "Science, Technology and Innovation Policy Research Center (SciREX center)" for developing guides and approaches to implement evidence-based policies.

The National Institute of Science and Technology Policy has conducted research and analysis based on administrative needs, including research and study on the pervasive economic and social effect of research, development and investment of the government and established an information base for collecting and accumulating data to make STI policies and for research, analysis and study on STI.

In addition, the Research Institute of Science and Technology for Society (RISTEX) of JST analyzes social issues and the present situation and potential of S&T required to solve these issues and contribute toward medium- to long-term policy-making and based on the resulting evidence, supports R&D for methods and guides to make policies in rational processes through public invitation. 53 R&D projects were applied for in FY 2014, and five projects were selected and started together with 16 projects selected from FY 2011 to 2013.

(4) Interactive policy-making

The recent matter of policy have features that they relate intricately to various external and internal factors and involve many stakeholders and the surrounding situations, while public needs frequently change as globalization progresses and based on other factors. Under these circumstances, MEXT promoted the introduction of an approach to interactive policy-making, proven to be effective in the government agencies in Europe and private companies in Japan as a way of improving the policy-making function (including program design), set up the Office of Interactive Policy-making in October 2014 and provided a permanent space in the ministry to promote dialog with internal and external stakeholders.

Column 2-5 Domestic and international approaches to interactive policy making

Recent policy issues are intricately related to various external and internal factors and involve many stakeholders. Moreover, circumstances surrounding policy issues and public needs frequently change according to the progress of globalization and other factors. The entire vision of policy issues is becoming difficult to comprehend, but a drastic increase in the budget to take measures is not easy. Accordingly, the effective and efficient planning and execution of individual measures and programs are more important than ever.

Under these circumstances, interactive policy-making has been highlighted as a new method of forming policies.

The concept of interactive policy-making is comparatively new and has various definitions, but the main factors include information exchange between key policy-makers, consultation and discussion among stakeholders, including local residents and general citizens, information-based political advice, joint decision-making and policy implementation involving stakeholders[1]. As a specific approach to promote interactive policy-making, a (permanent) space is provided in the central bureaucracy to encourage communications in the U.K., Netherlands and other European nations. It is intended to encourage staff to change their daily mindset and present new ideas and intention for total optimization to facilitate project progress. In the National Tax Agency in the Netherlands, for example, policies for improving tax collection, which is becoming difficult in complicated modern society, are proposed in the interactive policy-making system. Additionally, the Ministry of Infrastructure and the Environment of this country succeeded in significantly shortening the period from planning to implementation of a plan to construct a canal by making the plan together with stakeholders.

Shipyard in the National Tax Administration Agency in the Netherlands
(Lighting and interior are designed for facilitating the presentation of ideas and concentration)
Source: MEXT

In Japan, there is a space provided for discussing open innovation, in which external knowledge and technologies are used proactively in many companies. This may lead to an interactive policy-making system.

According to the results of interactive policy-making system in the government agencies in Europe and private companies and research institutions in Japan, MEXT decided to introduce an interactive policy system as an approach to improve the policy-making function (including program design) and set up the Office for Interactive Policy-making in October 2014. It also provided a permanent space in the ministry to promoting dialog and cooperation with internal and external stakeholders, including companies, universities and citizens and promoting R&D using an interactive policy-making approach as part of a science promotion program for STI policies.

1 Refer to Jacob Torfing and Peter Triantafillou, eds. (2011) Interactive Policy Making, Metagovernance and Democracy. ECPR Press.

2 Enhancement of Assessment and Allocation Functions in the Research-fund Systems

(1) System reform for the effective and efficient assessment and allocation of research funds

According to the Basic Policy[1], which states "the competitive fund systems that have a similar purpose or subject of R&D will be consolidated within or across government ministries and agencies," MEXT promotes efficient R&D by consolidating all fund systems into five systems, including the Grants-in-Aid for Scientific Research (KAKENHI).

In order for research funds to be utilized effectively and efficiently, as based on the "2011 Action Plans" (July 2010), efforts to unify, streamline and rationalize rules for the use of competitive funds are being made in all relevant ministries, agencies and fund-distribution organizations. In FY 2013, MEXT made it possible for researchers to combine multiple competitive research funds the purchase of equipment and supplies necessary for research. Additionally, in FY 2014, rules were formulated to increase the flexibility for researchers in appropriating research funds to various expense items on the condition that approval of the organization allocating the research funds is not required regarding the items.

(2) Improvement and enhancement of the competitive fund system

The competitive fund system is a core research-fund system for the establishment of a competitive research environment and for the consistent development and ongoing commitment to researchers in various and creative R&D activities. Efforts have been made to reserve budgets and improve the system (411 billion yen for FY 2014 budget, Table 2-5-2). The indirect cost, a feature of the competitive fund system, is allocated as a proportion of research funds to the institution to which the researcher granted competitive funds intended to promote competition among research institutions. In FY 2014, 30% of the direct cost was reserved. MEXT organizes an investigative commission by experts to discuss the direction of reform in competitive funds, including how to handle indirect costs for "sustainable maximization of research outcomes" as part of discussions for the next basic plan and with the integrated reform of universities in mind.

Regarding R&D management work, including issuing invitations to the public and the application of competitive funds, the "cross-ministerial R&D management system" (e-Rad[2]) is used to expedite the process for researchers and to avoid illogical overlaps and to avoid excessive concentration of fund allocations. The current system allows users to display information entered into a public database with e-Rad and to modify it to create a summary document of each researcher's career and achievements, which improves the efficiency of users' applications and the management of their work in regard to requesting research funds.

In order to ensure the fair, transparent and high-quality examination and evaluation of research proposals, the government ensures diversity in the age, gender and affiliation of examiners. It also aims to eliminate stakeholders, to develop an examiner-evaluation system, to specify methods and criteria for examination and adoption and to disclose examination results.

For example, the examination of KAKENHI applications is conducted via a process of peer review by more than 6,000 examiners. JSPS selects examiners from the examiner candidate database (enrollment of

1 The report on Consultation No. 11 "Japan's Science and Technology Basic Policy Report" requested to CSTP (December 24, 2010).
2 Short for Electronic Research And Development

about 80,000 researchers as of FY 2014) by taking into account the balance among research institutions and the aggressive promotion of young and female researchers. The disclosure of examination results has also improved every year. In addition to numerical information, such as a rough ranking of all unsuccessful research application and the average score of each evaluation element, detailed items in each evaluation element that examiners have judged as being inadequate are disclosed through the Electronic Application System for KAKENHI to give the applicants a more detailed evaluation of the results.

Concerning measures to prevent the inappropriate use of competitive funds and other public research funds, the CSTP provided the "measures to prevent the inappropriate use of research funds" (August 31, 2006) common to ministries which, in turn, have created and operated relevant guidelines for countering misuse of public research funds. MEXT created the "Guidelines for Management and Audit of Public Research Funds at Research Institutions (implementation standards)" (February 15, 2007) ("Guidelines"), which called for research institutions to establish necessary systems to manage and audit public research funds. MEXT has been holding seminars to promote understanding of the Guidelines.

For the purpose of enhancing research institutions' independent systems for managing and auditing research funds, MEXT conducts surveys on the compliance of research institutions to the specified guidelines and also continues follow-up surveys. MEXT provides guidance to the research institutions that keep failing to comply with the guidelines, etc.

Because the abuse of research funds has become a significant social issue, the ministries concerned have revised guidelines to prevent any unauthorized use of allocated funds. MEXT also revised its guidelines in February 2014 to clarify the responsibilities of organizations and prevent misconduct.

■ Table 2-5-2 / List of Competitive Funds

Ministry /Agency	Sponsor	Program	Description	FY 2013 Budget (million yen)	FY 2014 Budget (million yen)
CAO	Food Safety Commission	Research Program for Risk Assessment Study on Food Safety	Conducting research to determine guidelines and standards on risk assessments through a "research-area setting type" competitive fund system, which sets out research areas and publicly invites researchers to promote scientific food safety (risk) assessments.	189	194
CAO Subtotal				189	194
MIC	MIC	Strategic Information and Communications R&D Promotion Programme (SCOPE)	Publicly inviting proposals for unique and novel research subjects in the field of information and communications technologies (ITC) widely from research institutions at universities, incorporated administrative agencies, companies and local governments and offering contract research to institutions selected by external experts to foster young ICT researchers, revitalize regions with ICT and develop advanced communication applications, etc.	2,351	2,548 (*1)
	MIC	Strategic International Collaborative R&D Promotion Program	Supporting collaborative R&D by domestic and foreign research institutions to accelerate international standardization and practical use of R&D outcomes, create innovation, strengthen the international competitiveness of Japan and improve the safety and reliability of daily lives, society and the economy.	379	-
	MIC	Challenge Program for ICT Innovation Creation	Promoting comprehensive support to develop businesses by using know-how of commercialization, such as venture capital, R&D by SMEs and universities for practical application of R&D results in ICT field and creating new businesses.	-	500
	MIC	R&D of Technologies for Resolving Digital Divide	Enhancing communications and broadcasting services for the elderly and disabled by offering political support for R&D to benefit these groups.	65	47
	MIC	Promotion Program for development of advanced communication applications	Supporting the development of advanced communication applications using "next-generation" (future) networks that enable flexible network setting and operation for controlling paths and bandwidths	316	-
	Fire and Disaster Management Agency	Promotion Program for Fire and Disaster-Prevention Technologies	A program established in FY 2003 to develop fire and disaster-prevention technologies into innovative and practical technologies and widely invite enabling research and development in industry, academia and government, including universities, private companies, research corporations and Fire-Defense Headquarters.	182	153
MIC Subtotal				3,293	3,248
MEXT	MEXT/ JSPS	Grants-in-Aid for Scientific Research (KAKENHI)	Targeting the rapid advancement of scientific research according to researchers' own ideas in all scientific fields from the humanities and the social sciences to the natural sciences and funding creative and pioneering research selected in a peer review (decided by multiple researchers having the same or similar specialties), supporting the foundation of an affluent society through .	238,143 (Grants allocated to researchers 231,790 (*2))	227,616 (Grants allocated to researchers 230,451 (*2))
	JST	Strategic Basic Research Programs	Forming time-limited consortia beyond institutional boundaries (virtual network institutions) to promote R&D for creating new technologies useful for solving critical issues in Japan under policies determined by a top-down approach based on social and economic needs.	62,548	61,241

	JST	Industry-Academia Collaborative R&D Programs	Promoting R&D using intellectual properties by specific university (researcher) and specific company and R&D using a platform supporting multiple universities (researchers) and industry to promote the practical application of research outcomes at universities through industrial-academia collaboration and create innovation.	29,322	27,079
		International Collaborative Research Program	Promoting international collaborative research with developing countries to address global challenges in environmental and energy fields, disaster-prevention, infectious disease control and bioresources via excellent S&T and ODA in Japan and strategically promoting collaborative research on most advanced technologies with Europe and emerging Asian countries under equal (50/50) partnerships based on intergovernmental agreements.	3,437	3,319
	MEXT/ JST	R&D Promotion for National Issues	Setting detailed R&D themes for the challenges faced by Japan and selecting outstanding proposals based on the potential achievement of technological targets.	23,658	28,755
MEXT Subtotal				357,108	348,010
MHLW	MHLW	MHLW Grants	Formulating a competitive research environment for original or pioneering research and strong social demands and promoting health, labor and science research to maintain the scientific promotion of administrative policies regarding healthcare, welfare, environmental health and industrial health and safety and enhancing technological standards.	31,218	38,565
	National Institute of Biomedical Innovation	Grants to promote the Development of Orphan Drug and Orphan Medical Devices (*3)	Supporting pioneering research in fields with high risks of R&D or where it is difficult for companies to conduct proactive R&D such as difficult-to-treat or rare diseases, or using innovative technique or approaches and disseminating the results.	3,011	2,847
MHLW Subtotal				34,229	41,412
MAFF	MAFF	Science and technology research promotion program for agriculture, forestry, fisheries and food industry	To create innovations that make agriculture, forestry, fishery and food industries grow, a system to ensure the use of basic research results by public research institutions as practical applications at production sites through collaboration with private companies to return public funds to producers in agriculture, forestry and fishery industries and society. This program aims to integrate domestic research powers and activate the interchange of human resources by optimally exploiting Japan's high R&D capabilities in agriculture, fishery, forest and food industries and gaining participation of cross-cutting research power in private companies, as well as supporting industry-academia collaborative research to solve technological issues and improve industrial competitiveness. In this program, seamless support is provided for each stage of R&D, as "seeds creation stage" for basic R&D, "development fusion stage" for application R&D and "practical technology development stage" for practical application R&D and research topic proposals are publicly invited.	4,576	5,217
	National Agriculture and Food Research Organization	Basic Research Promotion for Creation of Innovation	Promoting comprehensive application research to evolve basic research for developing technological seeds and developed technological seeds containing potential to innovate technology or produce new industries in future into developing practical technologies based on creative ideas of researchers and basic research in diverse fields to address various issues in agriculture, forestry and fishery policies in	2,057	-

			terms of technology and promote collaborative R&D for recovery from the Great East Japan Earthquake between universities, public experimental research institutions and other public research institutions having technological seeds with the potential for commercialization and private companies intending to commercialize research outcomes.		
MAFF Subtotal				6,633	5,217
METI	METI	Promotion Program for Collaborative Business Creation by Manufacturing (Monozukuri) SMEs and Small Entrepreneurs	Supporting R&D and prototyping leading to the improvement of 11 technologies, including precision work and 3D modeling pursuant to the Basic Act for Buildup of Fundamental Monozukuri Technologies advancing fundamental monozukuri technologies of SMEs. Also supporting verification studies by SMEs and small entrepreneurs through licensing by universities to promote the utilization of knowledge at universities by SMEs.	-	6,334
	METI	Supplementary Program for Creating Innovations by regional SMEs	Supporting verification studies (verification or performance assessment of practical application of technology); mainly conducted by small- and medium-sized regional enterprises in collaboration with universities, colleges of technology and public research institutions.	296	-
	NEDO	Program for Advanced Industrial Technology Creation (Grants for Young Researchers)	Granting funds for outstanding research themes selected from applications from young (individual or team) researchers at universities, inter-university research institutes, national research institutes, colleges of technology, incorporated administrative corporations, public experimental research institutions, foundations and incorporated associations; ("universities and research institutes") through public invitations to enhance industrial technology in specified technological fields and themes that industry expects the universities and research institutes to address.	779	638
METI Subtotal				1,075	6,972
MLIT	MLIT	Construction Technology Research and Development Subsidy Program	Granting funds for R&D of technologies helping refine and enhance the international competitiveness of construction technologies under MLIT's jurisdiction to promote technological innovation in the construction field. There are two types of public invitation: "public invitation of technology development to solve policy issues (general type, SME type) and "public invitation of technological development to address earthquake disasters." MLIT provides grants for technology and for developing research on R&D themes appropriate for each type.	283	257
	MLIT	Program to promote Technological Development of Transportation	An open annual invitation for the proposal of research topics related to policy issues of MLIT is made among research institutions. Selecting prospective topics among those proposed and commissioned to conduct the research as the R&D projects.	175	159
MLIT Subtotal				458	416
MOE	MOE	Environmental Research and Technology Development Fund	Promoting scientific knowledge accumulation and technological development essential for implementing environmental policies to realize a sustainable society by preventing global warming, forming a recycling society, coexisting with the natural environment and managing environmental risk	6,160	5,510

MOE Subtotal	6,160	5,510
Total	409,145	410,979

Note: The subtotal and total may not match due to rounding.

*1: International collaborative type R&D and R&D to promote the development of advanced communication applications were integrated in FY 2014.
*2: The budget does not represent grants of the aid fiscal year because research costs used for the next fiscal year or later are included in the budget (foundation part) due to the introduction of "foundation" in part of the categories in FY 2011. Therefore, both budgets and grants are specified.
*3: The budget is the amount of the continued basic research promotion program for the old-age healthcare medical fields in Grants to promote the Development of Orphan Drug and Orphan Medical Devices.

Source: Created by MEXT

3 Enhancement of R&D Implementation Systems

In order to attract intellectual capacity to Japan to strengthening innovative, creative capability, R&D systems need to be strategically reformed. The 185th extraordinary session of the Diet enacted the Revised Act on Enhancement of Research and Development Capacity and Efficient Promotion of Research and Development by Advancement of Research and Development System Reform (hereinafter: Revised Act on Enhancement of Research and Development Capacity) on December 5, 2013. The legislation was introduced by Diet members with the idea of continuous reform of the R&D system by strengthening R&D capabilities and promoting R&D efficiently. The Act calls for creation of a new R&D institute system, establishing a research administrator system, exempting researchers from the Labor Contract Act, contributing R&D institute and making provisions for resource allocations to R&D on the safety of Japan and its nation.

(1) Reform of R&D institutes

The R&D institute is an incorporated administrative agency performing R&D activities that are difficult for private sectors or universities, such as long-term, with strong publicness, or high-risk R&D. Its capability needs to be enhanced to promote STI.

Accordingly, the "Revised Act on General Rules of Independent Administrative Agency" (No. 66, June 13, 2014) was passed at the 186th ordinary Diet session (enacted on April 1, 2015) based on the establishment of the "Revised Act on Enhancement of Research and Development Capacity" and the "Basic Policy on Reform of Independent Administrative Agencies" (decided by the Cabinet on December 24, 2013). Pursuant to this act, the R&D based independent administrative agencies are defined as "national R&D institute" classified as a different category from other corporations and the following special institutional measures are taken: 1) The purpose of research institute is to maximize R&D outcomes, 2) Their activities are based on longer medium- to long-term (five- to seven-year) targets and plans, 3) The Minister of Internal Affairs and Communications must appropriately comply with the guidelines determined by the Council for Science, Technology and Innovation (CSTI) when producing guidelines for goal setting and evaluation based on the nature of R&D programs and 4) The minister concerned must be advised by the committee for R&D based on scientific knowledge and international standards when setting goals and conducting evaluations.

The Comprehensive Strategy on Science, Technology and Innovation 2014 and related plans were approved by the Cabinet on June 24, 2014. Improvements in the operation of R&D institutes salaries, goal

setting, performance evaluation, procurement of materials and labor and handling of separate issues, based fully on the nature of R&D (long-term nature, uncertainty, unpredictability and specialty).

The Comprehensive Strategy on Science, Technology and Innovation 2014 says it is expected that R&D institutes play a central role in establishing a collaborative system across boundaries of industry, academia and government and vertical management of administrative agencies, centering on R&D institutes as potentially world-class international industry-academia-government collaborative research and networked centers and as an engine to reform the innovation system in Japan. The government decided to support outstanding and potential activities to construct an innovation hub centering on national R&D institutes beyond borders, among industry, academia and government sectors based on corporate restructuring, which commenced in April 2015.

For example, reforms required the establishment of a base for national R&D institutes to drive innovations by adding grants allocated to operate national R&D institutes and funds from JST and support maximization (leaps forward) of R&D outcomes. R&D institutes were traditionally evaluated based on uniform standards applied to other independent administrative agencies, but this has changed. The minister concerned will set, modify and evaluate medium- to long-term targets by taking the nature of R&D into account and focusing on the maximization of R&D outcomes according to guidelines[1] specified by the CSTI and guidelines[2] determined by the Minister of Internal Affairs and Communications based on CSTI guidelines.

The government also determined to define national R&D institutes dealing with creative projects to produce world-class outcomes as "Specific National R&D Institutes" (provisional) by law according to the "Basic Guidelines for Reform of Independent Administrative Agencies" and supervised under closely relation of the CSTI and the minister concerned and special management measures.

(2) Development of a system for effectively promoting research activities

In order for universities and public research institutions to promote research activities effectively and efficiently, in addition to recruiting researchers, it is necessary to develop a system enabling active employment for various personnel specialized in the management of overall research activities, in the management and operation of intellectual properties and in the maintenance and management of facilities and equipment. However, individual research institutions cannot secure of these specialized personnel and most researchers do not have enough time beyond their own research for managerial work. In response, the government will strengthen efforts to improve these conditions.

Considering this situation, MEXT supports fostering and securing human resources capable of conducting research management (research administrator) at universities and other institutions (URAs) (see Section 1-(3) of this chapter).

In order to create internationally competitive industries, the Japan Patent Office, through the National Center for Industrial Property Information and Training, has dispatched intellectual property management experts, called "intellectual property producers (IPPs)," to universities and R&D consortiums, where public funds are allocated in expectation of innovative output.

1 "Guidelines to evaluate R&D clerical work and program-related work (draft)" (CSTI, July 17, 2014)
2 "Guidelines for setting targets by independent administrative agencies," "Guidelines to evaluate independent administrative agencies" (determined by the Prime Minister on September 2, 2014)

In order to assist in the design of research plans to be implemented in collaboration with universities, incorporated administrative agencies and public research institutions, MAFF offers support for the deployment of coordinators throughout the country who are specialized in agriculture, forestry and fisheries and in the food industry. This support includes the introduction of viewpoints on the management of technology (MOT), including the strategic uses of intellectual property.

4 Establishment of the PDCA Cycle in Science, Technology and Innovation Policy

(1) Ensuring the effectiveness of the PDCA cycle

In order to promote STI policies effectively and efficiently, it is necessary to set clear performance targets, such as policies, measures and an implementation systems. It is also necessary to conduct timely follow-ups to ensure progress, and to consider the results when reviewing policies and resource allocation. Finally, it is necessary to plan new policies by establishing a PDCA (Plan-Do-Check-Action) cycle. For this reason, the government has been promoting efforts for ensuring the effectiveness of the PDCA cycle. Specifically, the government set the National Guideline on the Method of Evaluation for Governmental R&D ((National Guidelines) instituted by the Prime Minister in FY 2012 (see 4-(2) of this section)).

(2) Improvement and enhancement of R&D evaluation systems

To effectively and efficiently promote an internationally high-level of R&D that contributes to both society and the economy, as well as to the development of new science fields, it is important to make further improvement to the R&D evaluation system.

All ministries and agencies conduct R&D evaluation, based on their own detailed guidelines which specify evaluation methodologies that have been formulated in accordance with the National Guidelines.

In addition to the revision of the National Guidelines, MEXT revised the "Guidelines for Evaluation of R&D in the MEXT Proposal" ("MEXT R&D Evaluation Guidelines") in April 2014. The revision positions five items as considered special issues: 1) Creating science and technology based innovation; and promoting a system to solve problems, 2) Promoting high-risk research, inter-, multi- and trans-disciplinary research, 3) Promoting nurture and support for junior researchers who will lead the coming generation, 4) Preventing evaluation from becoming a mere formality, alleviating the growing burden of evaluation and 5) R&D program evaluation.

Based on the National Guidelines and the MEXT R&D Evaluation Guidelines, MEXT has been conducting evaluations in accordance with the objectives, policies and scales of each research project. This is based on a wide range of R&D covering everything, from scientific research stemming from researcher's free thinking and personal motivation in conducting R&D to large projects that realize a specific policy objective. In order to prioritize, the appropriateness of budget requests is judged by conducting an assessment by means of an external evaluation. An interim evaluation is then conducted to confirm the necessity of making changes to the plan, and an ex-post evaluation is conducted for application to the next deployment. Since much basic research leads to unexpected developments over time, care is taken to avoid evaluations that expect rapid output based on uniform and short-term points of view.

METI conducts preliminary evaluations, interim evaluations, post evaluations and follow-up evaluations

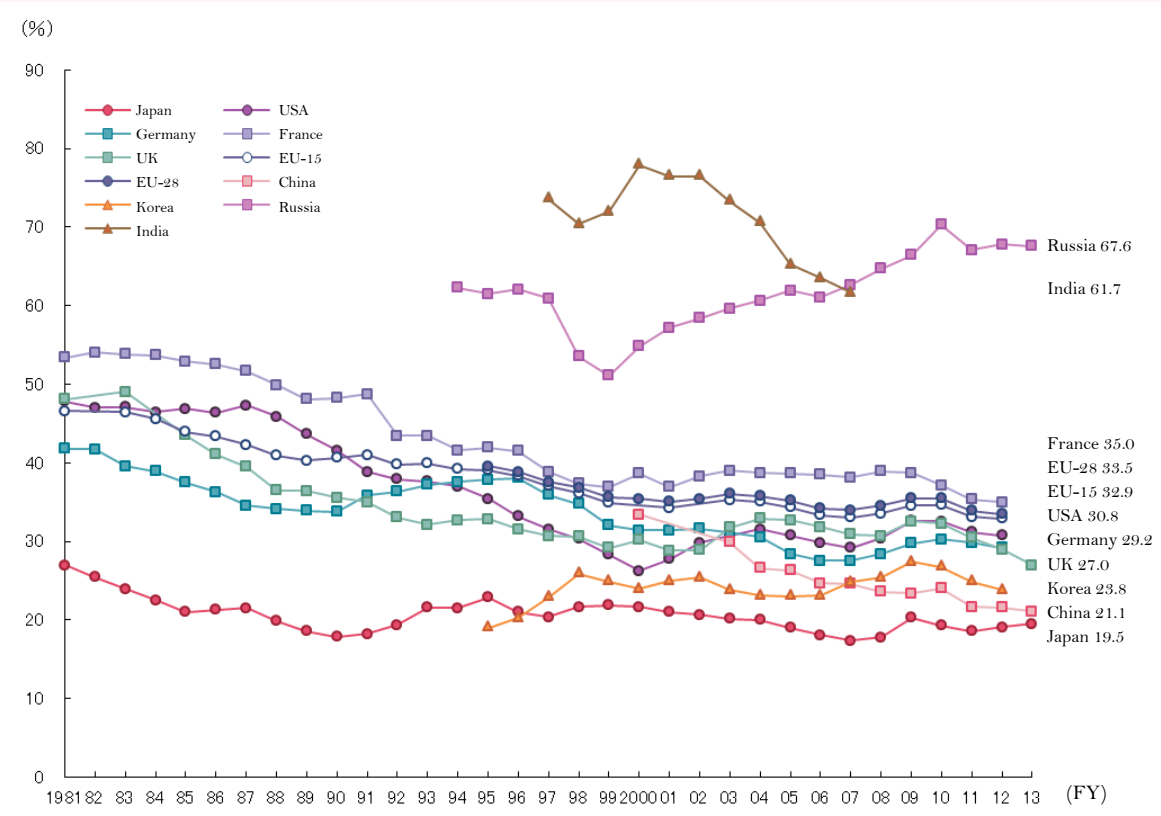
of R&D projects. It revised its "Technical Guidance on Evaluation" according to the National Guidelines revised in December 2012 to specify R&D themes and research funding systems as R&D programs and suitable evaluation of these programs, (programmed).

Incorporated administrative agencies and national universities are evaluated pursuant to the "Act on general rules for incorporated administrative agency," and "Act of National University Corporations," (No. 112 of 2003). The national research and development agency is evaluated by the competent minister pursuant to the "Guidelines for Incorporated Administrative Agency Evaluation" mainly with the aim of maximizing R&D outcomes (see 3-(1) of this section).

Section 3 Expansion of Research and Development Investment

The government set the expanded target of R&D investment to 4% or more of GDP in all government and private sectors by FY 2020. The 4th Basic Plan states "comprehensively, considering that the percentage of the Japanese government's burden of research costs is lower than that of foreign countries, considering that the government's investments are expected to produce the synergetic effect of promoting private-sector investment, which is currently hampered by a weak economy, and considering that many foreign countries are increasing S&T investment by setting targets, an expansion of investment is required" (Figure 2-5-3)

■ **Figure 2-5-3 / Trends in Government-financed R&D Costs in Major Countries**



Note: Defense-related research costs are included.
Source: Created by MEXT based on the "Report on the Survey of Research and Development" by the Statistics Bureau and "Main Science and Technology Indicators Vol. 2013/1" by OECD.

Although the financial situation in Japan is expected to become critical, the government should secure the expenditures necessary for promoting the measures outlined in the 4th Basic Plan to ensure consistency with the Fiscal Management Strategy, including the fiscal consolidation targets and the Medium-term Fiscal Framework decided by the Cabinet in June 2010.

Likewise, in order to introduce R&D investment in the private sector, which accounts for more than 70% of all R&D investments in Japan, the government, while respecting the principle of voluntary efforts being taken by private companies, should conduct rational reviews of regulations and systems, including the utilization of a tax system that facilitates R&D activities to stimulate motivation.

(Government R&D investment)

Government R&D investment in FY 2014 was 4.3529 trillion yen; comprised of 3.8771 trillion yen for central government, including both the initial budget and the supplementary budget and 475.8 billion yen for local authorities (for details of R&D investment by the central government, see Section 4-2, Chapter 1).

(Preferential treatment to promote R&D investment by the private sector)

To promote R&D in the private sector, various tax measures are provided as shown in Table 2-5-4.

In the tax system revision in FY 2015, tax credits for special R&D costs (costs for joint R&D by national

experiment and research institutions and universities, etc. and those for R&D commissioned to national experiment and research institutions, universities and SMEs) were reviewed together with the upper limit of deduction in the tax credit system (gross price type) for total R&D costs.

<Tax system revision in FY 2015 (tax credit system relating to the amount of special R&D costs)>

(1) Tax credit rate for R&D in collaboration with and commissioned to special research institutions and universities is increased from the current 12% to 30% (20% for research in collaboration with private companies and commissioned to specific small business entities (SMEs) and persons).

(2) The upper limit of tax credit amount of special experimental and research expenses is set to 5% of corporation tax amount for the relevant period apart from the tax credit system of total amount of R&D expenses and the tax system for strengthening the technical base of SMEs, Total tax credit amount is set to 30% of the corporation tax amount which includes the 5% of corporation tax(special experimental and research expenses), the tax credit amount of the system of total amount of R&D expenses(total amount type) and the upper limit of tax credit amount of the tax system for strengthening the technical base of SMEs (25% of corporation tax).

(3) Royalties for intellectual property rights paid to specified SMEs is added to special R&D expenses and local government organizations, public interest corporations and local independent administrative agencies are added to the entities to which R&D is commissioned.

(4) The carrying forward system for the excess over the limit is abolished.

■ Table 2-5-4 / R&D Taxation System

Purpose	Description	Applicable law	Remarks
Promotion of R&D investment by the private sector, etc.	Tax Credit for R&D costs. I. Proportional Tax Credits for total R&D costs* The R&D credit is a percentage (8 to 10%) of total R&D costs. (The maximum amount is 20% of corporate tax liability) II. Special Tax Credit on special R&D costs* For joint-experimentation research and experimentation research commissioned by universities, public experiment and research institutes, the National Experiment and Research Institute and other organizations, in addition to Item I above, a tax equivalent to 12% of the total R&D costs regarding such experiments and research is exempted (but limited to an amount equivalent to 20% of the corporate tax, including the special tax exemption in Item I above.).	Special Taxation Measures Act, Article 10, Article 10-2 (income tax) 42-4, 42-4-2, Article 68-9, 68-9-2 (corporate tax), Local Tax Act, Supplementary Provision, Article 8, Item 1.	Enacted in FY 2003 (the tax credit system for private business owners will remain the same throughout the table.)
	III. Tax system to strengthen the technical base of SMEs (Applied instead of I or II) (1) The tax credit amount is a value equivalent to 12% of the test and research costs at SMEs (but limited to a value equivalent to 20% of corporate tax) (*). (2) The tax credit amount in (1) above is excluded from the tax base for corporate inhabitants' tax (Local tax). (Remarks) 1. The tax credit amount, in relation to the above I through III is a value equivalent to 30% of corporate tax for only FY 2013 through FY 2014 2. In relation to the amount exceeding the tax credit mentioned in I through III, it can be deferred one year for deduction. 3. The tax credits for the above I through III are revised from FY 2015 as follows:		Enacted in FY 1985

	• The tax credit for special R&D costs is changed as follows: i) Tax credit for R&D collaborative with or commissioned to special research institutions and universities is increased from 12 to 30% and that for other organizations to 20%. ii) Tax credit limit is set apart from tax credits for all R&D costs and the tax system to strengthen the technical base of SMEs (5% of corporation tax). iii) The range of special R&D costs is changed as follows: 1) Corporations other than national R&D institutes are excluded from special R&D institutes, 2) Local government agencies, including public benefit corporations and regional independent administrative agencies, are added to the specified SMEs to which R&D is commissioned. 3) A license fee for intellectual property rights paid to SMEs is added. • Tax credits for all R&D costs and for the tax system to strengthen the technical base of SMEs are 25% of corporation tax. • Tax credit carried over is abolished.		
	IV. Special Tax Credits for increased R&D costs(*) Either of the following 1) or 2) will be selected and be applicable (limited to an amount equivalent to 10% of the corporate tax, apart from I through III) 1) When the amount of R&D costs exceeds 105% of the average (comparison R&D costs) of the R&D costs for each term in the three years prior to the current term and exceeds the peak R&D costs in each term in the two years prior to the current term, a tax equivalent of the amount left by subtracting comparative R&D costs from R&D costs and multiplied by the incremental R&D costs (up to 30%) is exempted. 2) When the amount of R&D costs exceeds 10% of sales for the current term and each term in the three years prior to the current term, a certain proportion of the excess is exempted. (*) Extended for three years to FY 2016.		Enacted in FY 2008

Source: Created by MEXT