

Chapter 4 Promoting Social Application of Research Results

Science and technology are progressing at a rapid pace that could not have been previously imagined and the rise of innovative technologies has an ever stronger economic and social impact. In order to increase opportunities to swiftly utilize and apply basic research results to society in today's world, it is necessary to establish a system to circulate knowledge, human resources, and funds beyond the borders of organizations and sectors and to fully utilize the power of each of these elements. Swiftly bringing research results into use in society also contributes to the establishment of an autonomous innovation system where domestic companies can secure their profits and they in turn can invest part of such profits in projects that enhance Japan's fundamental capabilities for science, technology and innovation (STI).

Japan has taken measures to achieve this, such as legal reforms aimed at building a virtuous cycle of knowledge, human resources, and funds through stimulating the creation of STI, reforms of the R&D tax credit system under which corporations are granted tax credits based on the amount of R&D expenditures, and the establishment of systems to promote the social application of research results.

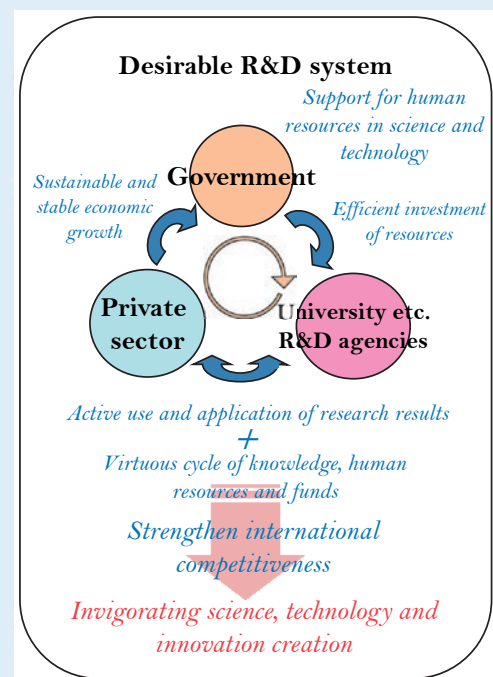
This chapter introduces you to the recent efforts that the government has taken concerning frameworks and systems to promote the social and commercial application of knowledge accumulated through basic research.

1 System-Related Efforts to Promote Social Application of Research Results

(1) Law on the Revitalization of Science, Technology and Innovation Creation

In June 2008, with the aim of strengthening Japan's research and development capabilities and creating innovations, lawmakers enacted the Act on Improving the Capacity, and the Efficient Promotion of Research and Development through Promotion of Research and Development System Reform (Act No. 63 of 2008; hereinafter referred to as the "R&D Capacity Strengthening Act"). They also enacted a law to amend the Labor Contracts Act (Act No. 128 of 2007) in December 2013. The amendment included a special provision to extend the period required for the application of the contract conversion rule (the rule that grants fixed-term employees the right to apply for a permanent labor contract when the total contract term of their contracts that have been extended for more than once exceeds five years) for researchers at universities and R&D agencies to ten years. The amended law also included a provision that allows

■ Figure 1-4-1/Virtuous cycle of revitalization of science, technology and innovation



Source: MEXT

certain R&D agencies (Japan Science and Technology Agency (JST), National Institute of Advanced Industrial Science and Technology (AIST), and New Energy and Industrial Technology Development Organization (NEDO)) to invest in R&D agency-initiated ventures.

In accordance with this law, the government has steadily implemented system reforms to strengthen Japan's R&D capabilities, such as the establishment of the national R&D agency system, the specified national R&D agency system, and innovative research and development programs. However, as the pace at which science, technology, and innovation change and international competition increase, Japan's relative position in the global community has been declining rapidly in recent years. In order for Japan to win against the intensifying international competition, it must urgently carry out systemic reforms with more emphasis on innovation creation, in addition to promoting ongoing efforts for strengthening R&D capabilities. From this perspective, lawmakers amended the R&D Capacity Strengthening Act in December 2018, redefining its purpose as the establishment of a virtuous cycle of knowledge, human resources, and funds, and revising the title to the Act on Science, Technology and Innovation Creation. The amended law entered into force in January 2019. The major amendments are as follows.

A. Investment by R&D agencies

The number of R&D agencies that are allowed to carry out investment has been increased from 3 to 22. In addition to R&D agency-initiated ventures, these agencies can now invest in venture capitals that support R&D agency-initiated ventures, and corporations that plan and coordinate joint research projects and the transfer of research results from R&D agencies to private companies (corporations to support the application of research results).

B. Acquisition and holding of shares by R&D agencies and national university corporations

The amended law provides that, when an R&D agency or national university corporation provides a intellectual property license or service to an R&D agency-initiated venture and when such investee venture only has scarce financial resources, said investing R&D agency or national university corporation can obtain and hold shares or share options of the venture instead of receiving money. This will make it easier for ventures to receive support from R&D agencies and national university corporations, while allowing R&D agencies and national university corporations to earn capital gains from the shares they obtained as the invested ventures grow.

C. Swift establishment of funds at funding agencies

Previously, a law amendment was required each time an R&D agency established a fund. The amended law has established a legal scheme that allows the five research and development agencies that are funding agencies (Japan Agency for Medical Research and Development (AMED), Japan Science and Technology Agency (JST), Japan Society for the Promotion of Science (JSPS), National Agriculture and Food Research Organization (NARO), and New Energy and Industrial Technology Development Organization (NEDO)) to swiftly establish a fund only with budgetary measures and without the need for any legal measures.

Based on the above amendments, the Cabinet Office and MEXT formulated the Guidelines on the Acquisition and Holding of Shares or Share Options by Research and Development Agencies and National

University Corporations in Relation to Support for Corporations to Promote the Application of Research Results, and the Guidelines on Investment by Research and Development Agencies. Following these guidelines, ministries and agencies are promoting appropriate operation of relevant corporations.

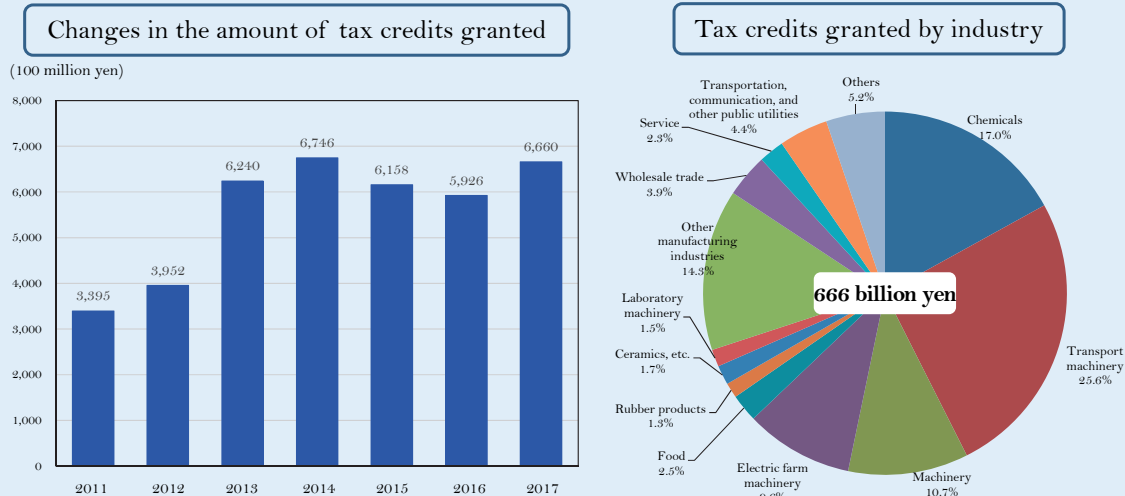
In addition, using the funds of funding organization, which now can be established quicker than before, the Cabinet Office, MEXT, and METI have established the Moonshot Research and Development Program with an aim to continuously and stably promote unconventional, bold R&D projects (including basic research and human resources development) and create disruptive innovations in Japan (see Part II, Chapter 1, Section 2, 2(5)).

(2) Tax System

A. R&D Tax Credit System

The R&D tax credit system was established with an aim to transform Japan into the most suitable country for innovation in the context of today's global trend. Under this system, the amount calculated by multiplying R&D expenditures by the tax credit rate is deducted from corporate tax that corporations conducting research and development need to pay. The objective is to maintain and expand R&D investment by private companies, to promote medium- to long-term and innovative R&D projects leading to innovation creation, and to enhance Japan's growth potential and international competitiveness. In 1967, Japan established for the first time a tax system that granted tax credits according to the increment in R&D expenditures. In 1993, Japan launched the special R&D tax credit system for open innovation, which granted tax credits based on expenditures of joint and contract research projects of universities, national research institutions, and private companies. After many revisions, there are three tax credit systems as of FY2018: (1) tax credits granted based on total R&D expenditures, (2) tax credits granted for open innovation projects, and (3) tax credits granted when the ratio of R&D expenditures to average sales exceeds a certain threshold. The upper limit on the total amount of tax credits is 40% of the corporate tax amount (see Part II, Chapter 5, Section 1). In FY2017, 11,956 companies received tax credits of 666 billion yen (Figure 1-4-2).

Figure 1-4-2/Amount of R&D tax credits granted



Source: Left figure: Prepared by MEXT based on Special Tax Measures Survey Report (MOF).
Right figure: Prepared by METI based on Special Tax Measures Survey Report (MOF).

In recent years, ventures established by universities and other research institutions have expanded their activities and grown vigorously. As of May 1, 2018, there are 38 university-initiated ventures and their total market capitalization has reached 1.8 trillion yen (Figure 1-4-3). However, their scale is still small compared to mega-ventures around the world. There is a need for further support for university and national R&D agency-initiated ventures. From this perspective, the FY2019 revision increased the upper limit of tax credits for certain R&D ventures with a view to promoting their growth. In addition, in order to further promote open innovation, the upper limit of tax credits for open innovation projects was raised. The tax credit rates were also raised for open innovation projects and joint and contract research projects involving R&D ventures. Figure 1-4-4 is an overview of the FY2019 reform of the R&D tax credit system.

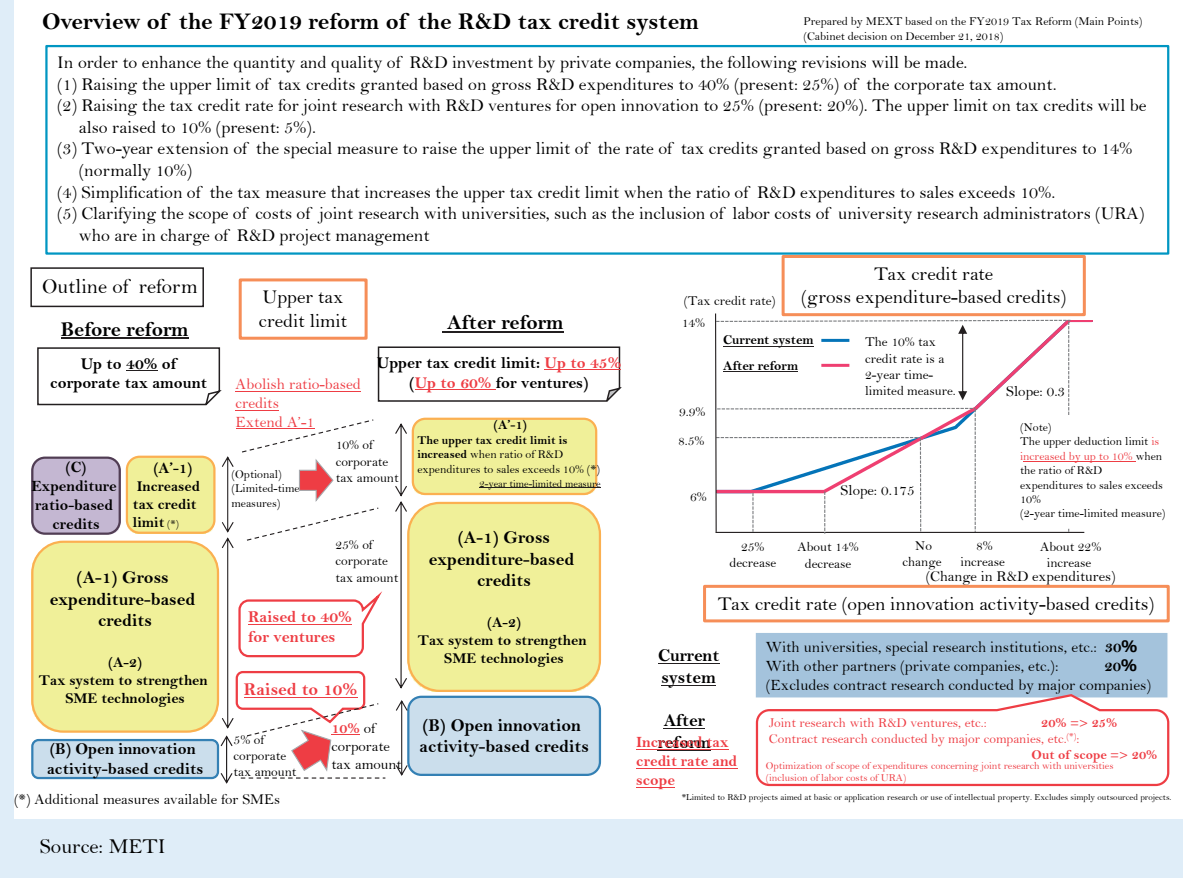
Figure 1-4-3/Main venture businesses originated from universities, etc.

Name of university-initiated venture	Date of establishment	Date of listing	Listed market	University, etc. where seed was created	Market capitalization (in millions of yen)
PeptiDream	July 2006	June 2013	TSE First Section	University of Tokyo	542,398
CYBERDYNE	June 2004	March 2014	TSE Mothers	Tsukuba University	193,111
PKSHA Technology	October 2012	September 2017	TSE Mothers	University of Tokyo	176,373
SanBio	February 2001	April 2015	TSE Mothers	Keio University	136,948
Eugulena	August 2005	December 2012	TSE First Section	University of Tokyo	84,851

Note: Total market value is as of May 1, 2018 (in millions of yen)

Source: Prepared by MEXT and the Japan Science and Technology Agency based on published materials (excluding delisted enterprises)

Figure 1-4-4/Overview of the FY2019 reform of the R&D tax credit system



B. Relaxing requirements for exemption from deemed capital gains tax on valuable assets donated to national university corporations, etc.

Japan has taken a tax measure to promote donations to universities and national research and development agencies. Under the previous system, individuals donating tangible assets to national university corporations, etc. were able to be exempted from deemed capital gains tax by obtaining approval from the Commissioner of the National Tax Agency. The 2019 tax reform greatly reduced the period required for obtaining approval for cases where tangible assets donated from individuals to national university corporations, etc. are managed by funds approved by relevant authorities. The requirements for diversion of assets managed by national university corporations under these funds have also been relaxed (Figure 1-4-5).

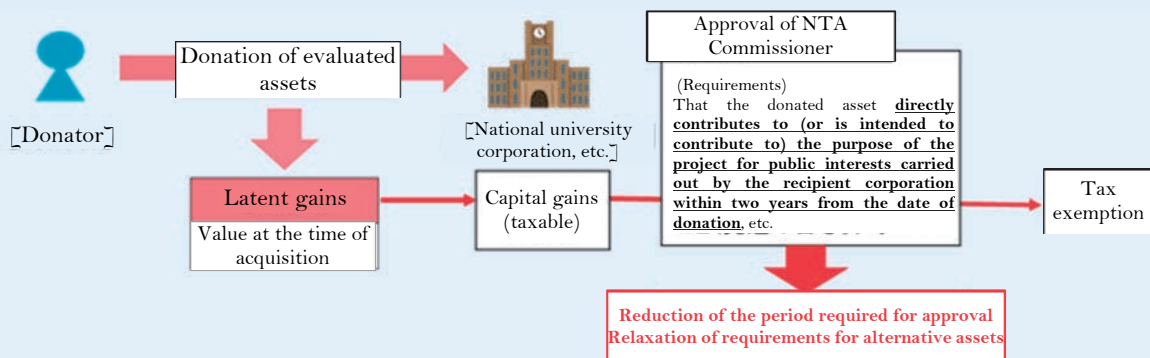
■ Figure 1-4-5/Relaxation of the Requirements for the Approval of Exemption from Tax on Deemed Capital Gains Regarding Donations of Evaluated Assets to National University Agencies, Etc.

The time required to obtain approval for exemption from tax on deemed capital gains is reduced when individuals have donated tangible assets (land, buildings, stocks, etc.) to national university corporations, national R&D agencies, etc. (*1) and the recipients manage the donated assets with funds approved by the competent authority. In addition, the requirements for alternative assets managed under such funds have also been relaxed.

For incorporated educational institutions (*2), stocks, etc. have been added to the scope of the simplified approval procedures for exemption from tax on deemed capital gains.

(*1) National university corporations, inter-university research institute corporations, public university corporations, the National Institute of Technology, national R&D agencies, public interest incorporated associations, and public interest incorporated foundations

(*2) Incorporated educational institutions and social welfare corporations



Source: MEXT

(3) Strategic Use of International Intellectual Property and Standardization

With the deepening of open innovation, strategies for the creation, protection, and utilization of Japan's intellectual property and maximization of its value are becoming ever more important. In order to respond to changes in the global environment of innovation and link as many of Japan's R&D results as possible with commercialization opportunities, METI has promoted intellectual property management appropriate for individual national R&D projects that are carried out by contractors, following the Guidelines for Intellectual Property Management in Government-Commissioned Research and Development (May 2015).

The Japan Patent Office (JPO) provides patent-related information online on its Japan Platform for Patent Information (J-PlatPat). Also, with a view to creating internationally competitive industries, the National Center for Industrial Property Information and Training (INPIT), a subsidiary organization of JPO, sends Intellectual Property Producers who are experts in IP management to universities and R&D consortiums conducting state-financed R&D projects that are expected to produce innovative results.

(4) Improvement of Research Capabilities and University Reform

To break through the ongoing relative decline of Japan's research capabilities compared to other countries, Japan launched the Acceleration Program for the Enhancement of Research Capabilities from FY2019 and has promoted measures such as a significant expansion of the grants-in-aid program (Kakenhi) and its allocation to younger researchers, the provision of opportunities for researchers to study overseas, and the enhancement of efforts contributing to research in emerging and integrated fields.

In addition, with a view to contributing to society through education and research, MEXT has promoted various reforms to support universities that play an extremely important role in the creation of science,

technology, and innovation, and increase their effectiveness and efficiency of management of knowledge, human resources, and funds. Specific examples of such measures include the establishment of the designated national university corporation system and implementation of the Leading Initiative for Excellent Young Researchers (LEADER).

With the birthrate continually declining and globalization intensifying, there is an urgent need for a university reform that will serve as the foundation for human resource development and innovation creation for Society 5.0. In this view, the government will simultaneously promote education, research, and governance reforms by providing aspiring young people with opportunities to advance to higher education, rigorously evaluating the efforts and performance of higher education and research institutions, and providing them with thorough support according to evaluation results. The policy package for this goal has been published under the title of the Reform of Higher Education and Research (Shibayama Initiative).

Under this Initiative, the government aims to accelerate and deepen the system for science, technology, and innovation and promotes measures to improve research capabilities under collaboration of related ministries and agencies and in an integrated manner with university reform. The objectives are as follows:

- (1) Foster the world's leading quality research personnel and secure the liquidity of such human resources;
- (2) Research fund reform to support researchers' in continuing to take on challenges; and
- (3) Establishment of a research environment that contributes to the improvement of research productivity.

2 System-Related Initiatives to Promote Social Application of Research Results

(1) Establishment of a System to Promote Open Innovation

Japan is developing centers and systems for promoting open innovation and utilizing the excellent seeds held within universities and R&D agencies. In FY2013, MEXT launched the Center of Innovation (COI) Program with an aim to support challenging and high-risk research projects focused on what Japan should aim for after a decade. The COI Program uses the backcasting method, meaning that research topics are selected based on a vision of future society that Japan should aim for. All relevant people from universities, companies, etc. are to work together “under one roof” to promote this program. 18 centers have been established for this program across Japan (see Part II, Chapter 5, Section 1).

Since FY2016, the Japan Science and Technology Agency (JST) has been implementing the Program to Open Innovation Platform with Enterprises, Research Institute and Academia (OPERA). OPERA is a matching fund-type R&D program that uses private funds from companies. It has formed the Co-Creation Consortium, in which universities and private companies serve as a platform. The aim is to realize full-scale industry-academia collaboration at the organization level by integrally promoting industry-academia collaboration research, human resources development in non-competitive areas,¹ and reform of the system for industry-academia collaboration.

From FY2018, MEXT started to develop an Open Innovation Mechanism as a system to centrally manage large-scale joint research projects that are deeply linked with corporate strategies (competitive areas), with a view to promoting such large-scale research and stimulate large investment by private

¹ Basic and fundamental research areas where universities and other private companies can share information on R&D results.

companies. In this project, MEXT supports universities in (1) developing a dedicated management team consisting of professionals (creative managers), and (2) organizing a team of excellent researchers that extends beyond departments. Through such efforts, MEXT aims to create a system within universities to attract large-scale private investments, so that they can establish autonomous management, and enhance their financial foundations, while also enhancing their research capabilities, promoting university reforms, and developing human resources through collaboration with companies.

As part of the Strategic Information and Communications R&D Promotion Program (SCOPE),¹ MIC has been promoting the Inno-vention Program (*inno* means “exceptional talent” in Japanese), which aims to support unconventional, ambitious, and high-potential R&D projects that take on technological challenges and look to create disruptive value with a global impact in the world of ICT, an unpredictable field where new technologies and ideas are born on a daily basis around the world.

(2) Driving an Innovation System Tapping into Regional Strengths

With a view to creating regional innovation, MIC, MEXT, MAFF and METI have designated certain areas as Innovation Strategy Promotion Regions. These regions have excellent innovation schemes that have been autonomously developed under collaboration and cooperation among local governments, universities and other research institutions, industry, and financial institutions. Relevant ministries thoroughly support these regions through their measures to help the smooth transition from the research phase to the commercialization phase. For example, as part of the SCOPE, MIC promotes R&D of ICT that will contribute to the creation of new value in the IoT/BD²/AI era, transformation of the social system, regional revitalization, and solution of challenges. MAFF provides support for regional innovation strategies to support R&D projects aimed at creating innovation in the fields of agriculture, forestry, fisheries and food as part of the Program to Promote Research Projects That Accelerate Innovation Creation. Ministries are implementing various other measures in 45 regions across Japan (see Part II, Chapter 5, Section 5, 2 (1)).

Moreover, in relation to the social application of research results in science and technology, efforts to harmonize science and technology with human society are required. In this sense, humanities and social sciences are becoming more important.

¹ Strategic Information and Communications R&D Promotion Programme

² Big Data