New Science, Technology and Innovation Policies and Scientists' Social Responsibilities
- Science Policy and Governance: Inventing the Future-
-

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"From Science and Technology Policies to Science, Technology and Innovation Policies"

The Government of Japan changed the title of its science promotion policies a couple of years ago from "Science and Technology Policies" to "Science, Technology and Innovation policies". The meaning of adding the word of "Innovation" is, of course, the Government intended to stress that innovating the society through permeation of the advancement of science and technology is fundamentally more important rather than mere scientific discoveries. That is, it is thought important to materialize the scientific knowledge and technological principles in the form of industrial products or social infrastructure which can actually make people's life more comfortable, convenient, healthy and prosperous.

SIP

Based on this new title, the Government of Japan showed recently two concrete policies in the science, technology and innovation fields. One is called SIP, Cross-ministerial Strategic Innovation Promotion Program, which is promoting government-led research development programs integrating traditional assignments to each ministry to solve socially important issues. Program directors with scientific or engineering background from universities, research institutions or private companies will be appointed to lead each program working closely with the Government STI policy headquarters. SIP program directors are now in the selection process in various fields such as energy, next generation infrastructure and local resources to design programs and to identify research projects and the leaders conducting those projects. The aim of the policy is to make government research policies more effective through integrating research projects so far separately conducted by different ministries.

ImPACT

Another policy is called ImPACT, Impulsing Paradigm Change through Disruptive Technologies, is explained to promote high risk/high return research development programs by government funding. In this program, program managers are appointed among university or private research institute researchers to identify programs and choose appropriate projects useful for those programs. Themes for the programs are discussed in the

fields of life-sciences, disaster reduction, disaster rescue program, material sciences and so on. Program Managers are expected to design unique programs which might be put into practice accompanying the risk of no gain and then find research projects and researchers who may contribute to achieve the goal working under the program managers.

These two new programs are quite different, because SIP is an integrated program to ensure the success of research projects by finally producing manufacturing products or social infrastructure; on the other hand ImPACT is trying to conduct ambitious research projects in which the success is not necessarily ensured.

Overall R&D and STI activities in Japan

Let me introduce the overall R&D activities in Japan, among which the above-mentioned two policies will play important roles to show new innovative direction. Huge money is spent for research and development by public and private sectors, which are 188 billion dollars accounting for 3.7% of GDP, covering basic, applied and development research and development. The Government sector occupy 18.6% in annual research and development expenditure in 2011. Since the share of defense R&D use is very little, almost all public R&D expenditure of Japan is used for non-defense purpose, securing research activities in basic research sector and promoting further applied and development research sectors.

The background of the new science policy is simple that scientific discovery produces new technology, which then brings about social innovation. As a country without abundant natural resources, Japanese people believe that science and technology is indispensable for its economic development by giving added value through manufacturing materials imported. Governments in Japan traditionally has been keeping this idea and promoting the development of science and technology, and took further step this time to show explicitly the importance of innovation.

The science, technology and innovation policy is basically supported by general public, but at the same time the government must consider at least three things in order that this policy is conducted properly: safety, integrity and equity.

Safety of Science and Technology

Because we experienced huge earthquake, Tsunami caused by the earthquake and nuclear power plants accident caused by the Tsunami, we must be worried about the increasing risk of severe accidents brought about inevitably by the development of sciences. The nuclear power plant accident in Fukushima makes 150 thousand people impossible to return to their hometowns because of high radiation level. This disaster is obviously the compound of natural and man-made disasters, in which science and technology has large responsibility. Japanese people learned once more that advanced science and technology may cause serious disasters when

it is out of control. The nuclear power plants in Fukushima lost its all electricity supply resources due to Tsunami, then they were unable to cool reactors, eventually the nuclear fuel became melt down. The people evacuated from the areas within a radius of 20km of the reactors, due to high level of radiation. Stricter regulations must be applied for the reoperation of nuclear power plants in Japan, where all of nuclear power plant suspend their operation now. Furthermore, severer problem is that high level radioactive wastes from nuclear power plants cannot find the places to be kept safely for hundred thousand years until their radioactivity gets harmless. We cannot find safe measure for safekeeping them such a long time. Therefore, it is questionable to continue nuclear power plants not only in Fukushima but also in other area in Japan safely. It is the role of science policy to show the possibility of alternative energy resources as soon as possible and to create the condition to stop the use of nuclear power energy without shortage of energy supply.

On top of this, the dual-use issue of advanced science and technology in bio, chemical and physical science and technology fields provide difficult problems from the point of view that we use science and technology for the peaceful and happy life of humankinds.

Research Integrity in Science and Technology

In the era of stronger influence of science and technology on the society and policies, the ethics of scientific research cannot be more important than before.

Misconducts in scientific research and the lack of research integrity lose the reliability of science and technology, and eventually impede its progress. On the other hand, as the role of science technology gets more important, bad motivation to distort scientific research for competing the first place too much get stronger. And then, scientist may fall into temptation to commit even misconducts to obtain results. Therefore, scientific academies in the world must play important role to secure research integrity to maintain the reliability of the people to science and technology.

Equitable Blessing of the Fruits of Science and Technology

While the people of industrialized countries enjoy results of science and technology, the people of poor countries cannot enjoy them, because science and technology develop only slowly in those countries. This unbalanced development causes further expansion of economic and social disparities between rich and poor countries. Therefore, it is crucially important to assure that even poor countries can enjoy blessings of science and technology through providing equal opportunities to the people of poor countries to obtain higher education and their involvement in scientific research and to make use of these opportunities for economic and social development of their own countries. It is most important task for science academies and scientists in industrialized countries to create various opportunities for this, such as scholarships, providing research funds, joint research

programs on top of international conference to share advanced science technology knowledge.

Science Council of Japan would like to promote new science, technology and innovation policies domestically, and to do our best efforts to develop safe and sound development of science and technology warning the risk of research integrity, and to contribute to supplying equal opportunity to scientific activities and scientists in all the countries.

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From Science and Technology Policies to Science, Technology and Innovation Policies

- Changing the title of its science promotion policies from “Science and Technology Policies” to “Science, Technology and Innovation policies” in Japan.
- “Innovation” means that the Government intended to stress that innovating the society through application of the advancement of science and technology is fundamentally important.
- Materializing the scientific knowledge and technological principles in the form of industrial products or social infrastructure is crucial for well-being of the people.

SIP, Cross-Ministerial Strategic Innovation Promotion Program

- SIP and ImPACT are new policies.
- SIP is promoting government-led research development programs integrating individual S&T policies done so far each ministry.
- Program directors will be appointed to lead each program working closely with the Government STI policy headquarters.
- SIP program directors are expected in various fields such as energy, next generation infrastructure and local resources to design programs and to identify research projects and the leaders constituting those projects.
- The aim of the policy is to make government research policies more effective through integrating research projects so far separately conducted by different ministries.

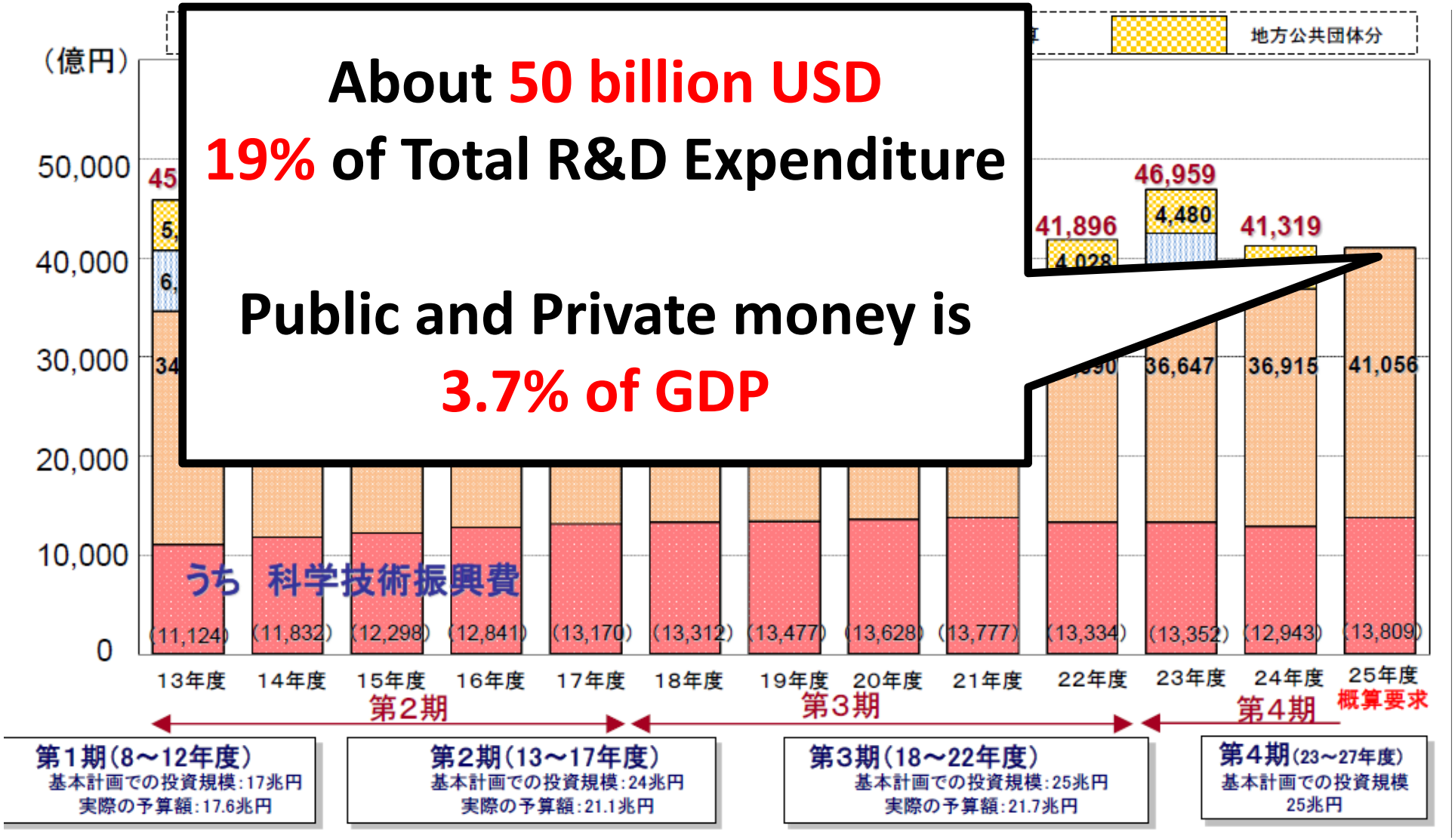
ImPACT, Impulsing Paradigm Change through Disruptive Technologies

- ImPACT is explained to promote high risk/high return research development programs.
- Program managers are appointed among university or private research institute researchers to identify programs and choose appropriate projects useful for those programs.
- Themes for the programs will be in the fields of life-sciences, disaster reduction, disaster rescue program, material sciences and so on.
- Program Managers are expected to set unique program with the risk of no gain and then find research projects and researchers who may contribute to achieve the goal.

Overall R&D and STI Activities in Japan

- Public and private R&D funding are 188 billion dollars accounting for 3.7% of GDP.
- The Government sector occupies 18.6%.
- Since the share of defense R&D use is very little, almost all public R&D expenditure of Japan is used for non-defense purpose, securing research activities in basic research sector and promoting further applied and development research sectors.

S&T Public Expenditure From 2001 to 2014



Background of New Science Policy

- The background of the new science policy is simple that scientific discovery produces new technology, which then brings about social innovation.

- As a country without abundant natural resources, Japanese people believe that science and technology is indispensable for its economic development.

- The science, technology and innovation policy is basically supported by general public, but at the same time the government must consider at least three things in order that this policy is conducted properly: Safety, Integrity and Equity in Science and Technology.

Safety of Science and Technology

- We experienced huge earthquake, Tsunami caused by the earthquake and nuclear power plants accident caused by the Tsunami.

- The nuclear power plant accident in Fukushima makes 150 thousand people impossible to return to their hometowns because of high radiation level.

- All of nuclear power plant suspend their operation now. Furthermore, severer problem is that high level radioactive wastes from nuclear power plants cannot find the places to be kept safely for hundred thousand years until their radioactivity gets harmless.

- It is the role of science policy to show the possibility of alternative energy resources in the earliest opportunity and to create the condition to stop the use of nuclear power energy without shortage of energy supply.

- On top of this, the dual-use issue of advanced science and technology in bio, chemical and physical science and technology fields provide difficult problems to be solved.

Science and Technology and Research Integrity

- The ethics of scientific research cannot be more important than before.
- Misconducts in scientific research and the lack of research integrity lose the reliability of science and technology, and eventually impede its progress.
- On the other hand, as the role of science technology gets more important, bad motivation to distort scientific research for competing the first place too much get stronger.
- Scientific academies in the world must play important role to secure research integrity to maintain the reliability of the people to science and technology.

Equitable Blessing of the Fruits of Science and Technology

- The people of poor countries cannot enjoy them, because science and technology develop only slowly in those countries.
- The unbalanced development causes further expansion of economic and social disparities between rich and poor countries.
- Even poor countries should enjoy blessings of science and technology through providing equal opportunities to the people of poor countries to obtain higher education and their involvement in scientific research and to make use of these opportunities for economic and social development of their own countries.
- It is most important task for science academies and scientists in industrialized countries to create various opportunities for this, such as scholarships, providing research funds, joint research programs on top of international conference to share advanced science technology knowledge.