

Japan's New Approach to Collaborative International R&D

More than four decades ago, Japan's Very Large Scale Integrated (VLSI) Semiconductor Research Project grabbed the attention of US and European policymakers for its remarkable approach to managing technological innovation. The model defied prevailing assumptions in the West about effective science and technology policy, which were grounded on the premise of government support for basic research conducted by universities. Instead, the VLSI project used Japanese government funds to support technology development conducted by industry through cooperative research and development. In 1985, Japanese companies accounted for five of the top ten integrated circuits sales companies in the world, and by 1988, Japanese firms had captured a 50.3% share of the integrated circuits market. In response to the competition, US and European science and technology policy eventually shifted to support public-private partnerships and joint industry research, emulating the Japanese system.

In the decades since, Japan's science and technology policy has adapted to its own set of crises, including the lasting economic effects of the 2008 global financial crisis and the 2011 Great East Japan Earthquake, tsunami, and Fukushima Daiichi Nuclear Power Plant accident. Following these disasters, the persistent strengthening of the yen put further pressure on Japan's export-led economy.

A 2012 report from Japan's Ministry of Economy, Trade, and Industry (METI) noted a growing disconnect between Japanese basic research and commercialization

efforts and insufficient business strategy in government-funded research and development. The report also noted that corporate R&D was rapidly shrinking and becoming more oriented toward short-term gains, and that Japanese companies were hesitant to collaborate with other entities and were therefore falling behind in open innovation. These conclusions raised concerns that Japan might be isolating itself from the international R&D collaborations driving global research productivity. To reverse these trends—and to reset Japan's competitive advantage in science and technology—the report recommended creating mechanisms to include foreign entities in Japanese-funded R&D projects.

In response, the Japanese government developed new regulations on foreign intellectual property (IP) that effectively created a new channel of direct funding for collaborative research between Japanese government-funded researchers and individual researchers in other countries. Directly funding foreign entities is a highly unusual practice outside of Official Development Assistance projects, and most government programs do not address foreign IP rights. By explicitly acknowledging and addressing the IP rights of foreign entities with its new regulations, the Japanese government implicitly created a pathway to foreign direct research funding and collaboration.

This is a radical approach to international research collaboration. No other major country actively promotes foreign participation in its flagship R&D programs.

Though now a decade old, the utility of Japan's policy change is still being tested. Few direct collaborations have been funded through the mechanism, but its potential remains significant. At a time of increasingly complex international engagement—when technology competition is shaping national and economic security, yet global challenges inform the priorities for research, which remains driven by a globalized network—Japan's unique strategy is worth considering as a potential model for other countries.

Conventional mechanisms used by governments to conduct international collaborative R&D include collaborative funding, joint funding, or bilateral funding. One example of a collaborative funding program is the Strategic International Collaborative Research Program (SICORP) supported by the Japan Science and Technology Agency. SICORP provides support for international joint research through intergovernmental agreements. In this model, Japan and one or more international partners cooperatively fund and operate a joint R&D program by providing support to their own participating research organizations. Since 2009, SICORP has supported joint

will be jointly owned with the Japanese government or an applicable governmental agency. The second regulation states that prior notification and permission are compulsory when transferring the ownership or granting an exclusive IP license to a foreign entity—this applies to any entity, foreign or domestic, that holds IP generated from Japanese government-funded R&D.

Though the regulations may appear to place restrictions on foreign IP rights, the intent of the policy is to clearly declare an avenue for foreign participation. As of fiscal year 2023, according to my research, projects under two of Japan's major funding programs—ImPACT and the Moonshot Research and Development Program—involve foreign entities participating and receiving funding from the Japanese government. So far, the resulting direct funding collaborations have supported projects with researchers in the United States, Australia, France, and Finland. Although these countries have also been involved in Japan's conventional SICORP joint research program, this new mechanism permits more innovative and expedient arrangements.

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R&D with 15 countries and a region; the program has also supported multilateral research cooperation.

These kinds of collaborations are important long-term investments, but the administrative barriers to conventional joint R&D efforts can be cumbersome. In general, collaborative funding programs require long-term preparation and governmental negotiation. The collaborating governments first must reach an intergovernmental agreement, and then each must appoint counterpart funding agencies that support R&D in the same fields. These arrangements can develop only when the administrations of the countries involved recognize the benefits of joint research from the outset—and at the highest levels.

By contrast, Japan's new direct funding mechanism enables agile collaboration with like-minded entities outside the country, without the bureaucratic effort. Two regulations, which cover the major Japanese R&D funding programs, uphold the mechanism. The first regulation states that a foreign entity must share 50% or more of the IP rights generated from the funded R&D with the Japanese government or an applicable governmental agency. If a joint patent results, the foreign entity's share

The new model enables Japan to collaborate with and provide funding to a foreign entity even if its country does not have a counterpart funding agency that supports R&D in the same field. In conventional funding schemes, differences in how funding agencies define and cover fields can make alignment difficult. However, under the new strategy, foreign researchers and research institutions can participate in Japanese government-funded international collaborative R&D even if they are unable to secure the support of their own country's funding agency to cover their share of the research.

Creating a mechanism that operates outside the traditional government-to-government funding arrangement means Japan can conduct international collaborative R&D with foreign entities even if the foreign government does not recognize the benefits of collaborating with Japan and has no intention of supporting collaborative R&D. This ability creates an opportunity for Japanese researchers to pursue collaborations with foreign researchers in countries that have more competitive research strengths in certain technology areas, like semiconductors, cloud services,

and artificial intelligence, which could be particularly advantageous for advancing Japanese research.

Furthermore, direct funding enables Japan to support research collaborations in countries with which it would be difficult for the Japanese government to reach an intergovernmental agreement (or even to negotiate), such as Taiwan. The Japanese government has signaled that it is prepared to provide up to 476 billion yen (approximately \$3.6 billion) in subsidies to the Japanese subsidiary of Taiwan Semiconductor Manufacturing Company Limited (TSMC)—established with several Japanese companies—for the development of semiconductor manufacturing infrastructure. Hypothetically, this funding can still be provided for joint research between TSMC and Japanese companies, even without TSMC’s Japanese subsidiary, because of the foreign IP regulations.

Still, a decade after these regulations on foreign IP were put into place, projects that pursue these opportunities remain untested. The regulations initially applied to two flagship programs launched in 2014 by Japan’s Council for Science, Technology,

participation in international R&D led to another METI report, in 2019, recommending that “active promotion” of global open innovation with foreign companies and institutions through government-sponsored R&D was necessary to maximize “contributions to Japan’s economic revitalization.” The report further recommended promoting open innovation with foreign companies and institutions not only through METI-funded R&D, but across all publicly funded national R&D projects. In response to the recommendation, in 2020, METI amended its funding guidelines to be consistent with the new IP regulations. Since then, all commissioned R&D by METI and its funding agency, the New Energy and Industrial Technology Development Organization, operates within the regulations on foreign IP. Consequently, the regulations now apply to the majority of Japanese government R&D funding.

Though few direct collaborations have been funded in the way the regulatory mechanism allows, its latent potential has significant implications for Japanese R&D, and possibly for international research collaboration in general. The Japanese government can now quickly

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and Innovation, which aimed to plan and coordinate comprehensive science, technology, and innovation policies directly under the leadership of the prime minister and the minister of state for science and technology. The first, the Cross-Ministerial Strategic Innovation Promotion Program (SIP), is Japan’s largest R&D and innovation funding program, with an annual budget of approximately 30 billion yen (or about \$200 million). The second, the Impulsing Paradigm Change through Disruptive Technologies (ImPACT) Program, was meant to catalyze disruptive innovation by promoting high-risk and high-impact R&D. The 55-billion-yen (\$370 million) fund operated until 2018, when it was succeeded by the Moonshot Research and Development Program, which set ambitious societal goals that are difficult to achieve but are expected to have a significant impact if realized, such as the creation of industries that enable a sustainable global food supply.

To achieve these Moonshot goals, the program explicitly encourages international collaboration and promises to bring “together the wisdom of researchers from all over the world.” But slow growth in Japan’s

and directly fund foreign entities whenever it sees an opportunity. The shift in this direction has been slow, but it is starting to take place. Four Moonshot R&D projects have supported foreign entities in the United States, Australia, and Finland, enabling partners to participate without having to secure domestic funding. This new policy has also encouraged international R&D collaboration in which a foreign entity secured its own funding without receiving financial support from the Japanese government.

The new approach has created new possibilities for conducting international collaborative R&D that were unfeasible under conventional schemes. While Japan’s strategy remains primarily at the “seed stage” for now, it has significant promise and represents a new model of international collaborative R&D that the global research community should consider.

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