

SCIENTIFIC AND TECHNOLOGICAL COOPERATION BETWEEN THE UNITED STATES AND JAPAN (2021-2025)

TRAN ANH CONG

Ph.D. Student in International Relations at
Hanoi University of Social Sciences and Humanities, Vietnam

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ABSTRACT

Since the 1988 Agreement, US-Japan science and technology cooperation has evolved into a strategic pillar amid intensifying global technological competition. During 2021-2025, cooperation centers on four priority areas: artificial intelligence (AI), electric vehicles (EVs), semiconductors, and 5G networks and digital infrastructure. The two countries not only co-develop international standards and spur innovation, but also strengthen technological autonomy, reinforce strategic supply chains, and expand regional influence which contributing to a reshaping of the global technology order.

Keywords: Cooperation; Science and Technology; United States; Japan.

1.0 INTRODUCTION

US-Japan science and technology cooperation is a pivotal aspect of the bilateral relationship, established under the 1988 US-Japan Science and Technology Cooperation Agreement to promote joint research, exchanges, and the application of science in support of socioeconomic development and national security [1].

Within this framework, the two countries have implemented nearly 160 cooperative projects in fields such as life sciences, information technology, advanced materials, and environmental technology (Ministry of Foreign Affairs of Japan, n.d.). This mechanism is coordinated by a Joint High-Level Committee, which meets regularly to set strategy and oversee the implementation of S&T cooperation [2].

Since 2021, US-Japan S&T cooperation has been elevated to a national strategic pillar, focusing on key technologies such as artificial intelligence (AI), semiconductors, 5G networks, and quantum computing, while aligning with the objective of ensuring economic security amid intensifying US-China technological competition [3].

A representative example is the two sides' co-development of a next-generation semiconductor research center under the Economic "2+2" Dialogue, designed to strengthen technological autonomy and reduce supply-chain dependence on China. The initiative is supported by mechanisms such as the US CHIPS Act and Japanese government R&D funding packages, with the aim of revitalizing an industry that flourished in Japan in the 1980s.

In the AI domain, the United States and Japan have launched two university-industry partnerships worth more than \$110 million to advance cutting-edge AI research, foster a

transparent AI ecosystem, and promote interoperability with international standards (US Embassy in Japan, 2023). Meanwhile, within the QUAD framework, the AI ENGAGE initiative is creating a cross-border collaboration environment for applying AI to smart agriculture, disaster risk reduction, and countering disinformation [4].

In defense-tech entrepreneurship, the 2025 US-Japan Global Innovation Challenge featured dozens of bilateral startups showcasing innovative security technologies, backed by the US Defense Innovation Unit (DIU) and Japan's Acquisition, Technology & Logistics Agency (ATLA) - the two leading agencies driving defense innovation.

Taken together, US-Japan S&T cooperation is not only the product of a solid diplomatic foundation but also a concrete expression of strategic alignment across future-defining technologies - from AI and semiconductors to defense innovation.

2.0 THE CURRENT STATE OF US-JAPAN SCIENCE AND TECHNOLOGY COOPERATION

The United States and Japan emphasize science and technology cooperation across four main areas: AI development, automobile manufacturing, semiconductors, and 5G networks.

2.1 Cooperation on AI development

Within the Hiroshima AI Process - launched at the G7 Summit in May 2023 under Japan's presidency - G7 leaders endorsed the "International Guiding Principles" and the "Code of Conduct for Organizations Developing Advanced AI Systems" to promote safe, trustworthy, and transparent AI worldwide [5]. These principles require AI developers to comply with international human rights law and to mitigate risks such as disinformation, privacy violations, and misuse of advanced systems. This demonstrates how the two countries cooperated to lead the G7 in creating the first international framework for generative AI, establishing an intergovernmental coordination model that strengthens social responsibility and transparency in AI.

Regarding bilateral cooperation, in April 2025 the Cross Pacific AI Initiative (X PAI) was signed by the University of Tsukuba, the University of Washington, NVIDIA, and Amazon, providing about US\$50 million over ten years for research, workforce development, and socially oriented AI applications [6]. This reflects multi-level coordination: governments fund the policy framework, while universities and enterprises supply technological capabilities, training, and real-world deployment. In parallel, within the US-Japan economic "2+2" dialogue launched in July 2022, the two sides have also advanced cooperation between NIST (United States) and IPA (Japan) as partner AI Safety Institutes to strengthen standards development, testing, and oversight of advanced AI models.

On the infrastructure side, Japan operates the ABCI 3.0 supercomputer, expected to be fully operational from early 2025, with performance of up to 6.22 exaflops (half precision) and 3.0 exaflops (single precision) - about 7 to 13 times that of ABCI 2.0-optimized for deploying generative AI research and for training high-caliber engineers [7]. In addition, cooperation between Japan and the U.S. startup Tenstorrent (a RISC-V-based AI chip company) includes a US\$50 million program to train up to 200 Japanese AI chip design engineers over five years at

its US headquarters, in support of Rapidus's plan to build a domestic chip production chain by 2027 [8].

Furthermore, the Geodesic Alliance Fund, jointly backed by the United States and Japan, has raised US\$250 million to invest in defense technology and AI startups that bolster security in the Indo-Pacific [9]. This exemplifies how the two countries align public and private resources to drive technological innovation in service of shared security.

2.2 Cooperation and development of the electric vehicle industry

To promote cooperation in developing the EV sector, in March 2023 the United States and Japan signed a Critical Minerals Agreement for electric-vehicle batteries, aimed at strengthening raw-material supply chains (lithium, nickel, cobalt, manganese) and facilitating access to the US Clean Vehicle Credit under the Inflation Reduction Act (IRA), worth up to US\$7,500 for EVs [10]. The agreement commits the two countries not to levy export taxes on minerals, encourages the sharing of regulatory expertise, and ensures labor and environmental standards in the mining industry.

This reflects both countries' recognition of the importance of advancing battery technology to make EVs more attractive to consumers and reduce reliance on fossil fuels. It is a strategic move to secure the availability of essential materials such as lithium and cobalt-critical for EV battery production-while mitigating risks related to supply-chain disruptions and promoting a sustainable supply of these inputs.

Moreover, cooperation in automobile production forms part of a broader strategic partnership to deepen economic and technological ties between the two nations. The partnership is viewed as a means to ensure that both sides remain competitive in a rapidly evolving auto industry increasingly oriented toward sustainability and transport electrification. Through joint efforts, the United States and Japan seek to lead the global shift toward sustainable mobility, reduce carbon emissions, and accelerate the adoption of clean vehicles.

Another important aspect of cooperation in this field is expanding EV charging stations and implementing policies designed to facilitate the widespread adoption of electric vehicles in both countries. For example, on February 10, 2022, President Biden established a US\$5 billion fund to help states build an EV charging network along major national transportation corridors [11], and Japan plans to install 300,000 EV charging stations by 2030 - double the target set in its 2021 Green Growth Strategy [12]. By learning from each other's experiences and strategies, the United States and Japan aim to accelerate the rollout of EV infrastructure, making it easier for people to switch to electric vehicles.

A recent commercial highlight is that Japan is considering financial support to promote adoption of Tesla's NACS charging standard at domestic stations, thereby opening the market to US cars such as Tesla - an element that would spur technological cooperation and address market barriers in trade negotiations with the United States. The NACS standard and the CCS-to-NACS adapter standard are viewed as an international trend with the potential to reshape the EV charging landscape in both the US and Japan.

Another facet of bilateral collaboration in this field is cooperation among manufacturing groups. Toyota has committed to invest US\$13.9 billion to build a battery plant in North Carolina, United States - scheduled to produce batteries for hybrid vehicles from early 2025 and for battery-electric vehicles from late 2025. This arrangement both leverages IRA incentives and expands battery manufacturing capacity in the strategic North American market. Domestic alliances such as Sony Honda Mobility (Afeela) are expected to launch their first EV in North America in 2026, targeting Level 3 automated driving and deep software integration - reflecting the trend of high-tech collaboration between Japanese and US companies. Nissan is also repositioning its EV lineup, with models such as the next-generation Leaf and the Micra EV aimed at the US and European markets; at the same time, it is developing the e-POWER hybrid line and electric SUVs to be produced in Mississippi [13].

2.3 Cooperation in Semiconductor Manufacturing

Given the growing importance of semiconductors across technologies - from consumer electronics to advanced military systems - the United States and Japan are working to expand production capacity and reduce dependence on supply chains from China, including through investments in fabrication plants and the development of next-generation semiconductor technologies.

In the Economic “2+2” Dialogue of July 2022, the United States and Japan agreed to establish a joint research center for next-generation semiconductors to strengthen technological autonomy and leadership in the face of supply-chain pressures from China [14]. This cooperation continued as both governments agreed to set up the Leading-edge Semiconductor Technology Center (LSTC) in Japan, in coordination with Rapidus and university–industry partners, to promote R&D on 2 nm chips [15].

On July 8, 2024, Resonac Holdings - Japan’s leading chip-materials producer—formed a consortium named “US-JOINT” with nine other Japanese and US companies, headquartered in Silicon Valley (United States), to co-develop key semiconductor manufacturing technologies for generative AI [16]. In addition, the two sides are funding joint research projects and building partnerships among universities, research institutes, and companies to drive breakthroughs in semiconductor technology. On May 21, 2023, U.S. Secretary of State Antony J. Blinken and Japan’s Minister of Education, Culture, Sports, Science and Technology (MEXT) Keiko Nagaoka signed a memorandum of understanding on cooperation in education. Following the signing, leading U.S. and Japanese technology companies and universities announced more than US\$210 million in investments in universities, focused on quantum computing and semiconductor technologies. U.S. Ambassador to Japan Rahm Emanuel stated that “these partnerships are about seizing economic opportunity and strengthening economic security” and that “by connecting leading companies with top universities, we position ourselves to lead in critical technologies” [17]. Accordingly, IBM announced a US\$100 million, ten-year partnership with the University of Chicago and the University of Tokyo to develop the world’s first quantum supercomputer powered by 100,000 qubits; Google committed to a US\$50 million, ten-year strategic partnership with the University of Tokyo and the University of Chicago focused on quantum R&D and workforce development; and Micron launched a US\$60 million, five-year semiconductor engineering partnership with eleven universities: Purdue University; Rochester Institute of Technology; Rensselaer Polytechnic

Institute; the University of Washington; Boise State University; Virginia Tech; Hiroshima University; Tohoku University; Kyushu University; Nagoya University; and Tokyo Institute of Technology [18].

2.4 Cooperation on 5G and Digital Infrastructure

Regarding 5G networks, joint statements by the two countries' leaders consistently emphasize building a secure 5G internet as a strategic infrastructure platform that avoids risks from Chinese vendors. US policymakers have opted for Open RAN (Open Radio Access Network) as a way to enable broader competition and diversify suppliers - such as those from Japan. In April 2021, President Biden and Prime Minister Suga pledged a total investment of US\$4.5 billion in fifth-generation (5G) wireless development - US\$2.5 billion from the United States and US\$2 billion from Japan [19]. The two countries also established the Global Digital Connectivity Partnership (GDCCP) as a comprehensive framework to promote bilateral digital cooperation in third countries. This initiative creates opportunities for network providers from both nations to deliver 5G security solutions to other countries. Subsequently, the United States and Japan have also sought multilateral cooperation with QUAD partners to foster an open, accessible, and secure technology ecosystem among member states.

Both Japan and the United States are advancing Open RAN to enhance openness and competition in mobile radio access. Rakuten Mobile operates a nationwide O-RAN network in Japan and collaborates with RU (radio unit) vendors selected by the U.S. NTIA to support testing and market expansion [20]. In 2025, Kyocera established the O-RU Alliance with six Asian telecom partners to accelerate Open RAN deployment in Japan and across the region [21]. In addition, through the QUAD and financial support for Open RAN projects in Southeast Asia, the two countries funded the first Open RAN laboratory in the Philippines (about US\$3 million) to spur innovation and train digital network engineers [22].

2.5 Digital Infrastructure

Beyond telecommunications, US-Japan digital cooperation extends to data-transport infrastructure. Google has announced a US\$1 billion investment to build two subsea cable systems - Proa and Taihei - linking the United States with Japan and Pacific islands such as the CNMI, Guam, and Hawaii, in order to enhance secure and reliable connectivity. From the early days of 5G deployment, the United States and Japan have oriented cooperation toward Beyond 5G/6G, particularly leveraging mm Wave and terahertz spectrum. A bilateral policy group has been formed to prepare for these future technologies, working closely with emerging standards [23]. Japan, through its Beyond 5G Promotion Strategy, is investing roughly ¥50 billion in R&D and pursuing international cooperation on standards and intellectual-property strategy.

3.0 CONCLUSION

US-Japan science and technology cooperation during 2021–2025 has made strategically defining advances in both breadth and depth. Through joint initiatives in AI, electric vehicles, semiconductors, and digital infrastructure, the two countries have achieved several outcomes: First, the establishment of international norms in emerging technologies - especially AI and next-generation telecommunications - thereby extending influence beyond the bilateral sphere. Second, enhanced technological autonomy and mitigation of risks stemming from dependence

on single supply chains, particularly in strategic sectors such as semiconductors and critical minerals for EV batteries. Third, effective linkages among government, academia, and industry, forming a sustainable innovation ecosystem that serves both economic and national-security objectives. Fourth, regional and global spillover effects through multilateral cooperation (QUAD, G7) and support for digital infrastructure in third countries.

Nevertheless, this cooperation still faces challenges from geopolitical competition, differences in technical standards, and volatility in technology markets. To maintain their leadership role, the United States and Japan should continue aligning policies, increase R&D investment, and expand collaboration into new fields such as quantum technologies, clean energy, and cybersecurity.

In the period ahead, US-Japan S&T cooperation will not only determine the two countries' standing in the global digital economy but also help shape the technological order and international security for decades to come.

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