

Japan and the Resurgence of the Semiconductor Industry

In June 2021, Japan unveiled the "Strategy for Semiconductors and the Digital Industry" with the aim of restoring the country's international competitiveness in the chip manufacturing industry and promoting research and development in the next generation of semiconductors.

It is well-known that in the mid-1980s, Japanese companies such as NEC, Hitachi, Toshiba, Mitsubishi Electric Corporation, and Fujitsu emerged as dominant players in the semiconductor industry, covering everything from materials production to chip design, packaging and semiconductor manufacturing equipment. At that time, they surpassed US companies and came to control approximately 50% of the global semiconductor market.

It is important to highlight that this technological achievement occurred within a span of 20 years, thanks to a state policy focused on making Japan a global leader in the semiconductor industry. In this regard, analyst Hideki Tomoshige points out that Japan's industrial policy supported companies in research and development (R&D) from the early 1970s. This support included the establishment in 1976 of the Super LSI Technology Research Association, involving leading Japanese companies that focused on essential semiconductor technologies.

However, Japan's rapid rise and dominance in the semiconductor market generated tensions with the U.S. government, which accused Japan of unfair trade practices, dumping, and restricted market access for US products. The managed depreciation of the yen also made Japanese products more competitive in global markets.

As a result, in 1985, the United States, Japan, Germany, France, and the United Kingdom negotiated the Plaza Accord with the aim of adjusting the currency market imbalance. This agreement aimed to reduce the value of the dollar compared to major currencies, including the Japanese yen.

Furthermore, in 1986, the United States and Japan negotiated a semiconductor trade agreement to increase U.S. access to the Japanese semiconductor market and control Japanese exports to the United States. This agreement adjusted the trade imbalance, negatively impacting Japan's semiconductor manufacturing industry.

As a consequence of these monetary and trade agreements, Japanese products became more expensive, allowing US semiconductors to regain ground in the global market.

In summary, the appreciation of the yen, the emergence of cost-effective semiconductor manufacturers in countries like South Korea and Taiwan, and the slow adaptation of Japanese companies to changes in the global semiconductor production structure led Japan's global market share to drop from over 50% in 1988 to below 10% today. Nevertheless, Japan managed to maintain its global leadership in the production of materials and equipment for chip manufacturing.

However, China's rapid advancement in the global semiconductor market (similar to Japan in the 1970s) and its critical role in the supply chain have prompted a realignment of major competitors in the worldwide semiconductor industry, especially after the COVID-19 pandemic. It's important to remember that China's strict measures to control the pandemic led to the country's closure, significantly impacting the global semiconductor supply chain.

In addition to its prominent role in the global semiconductor supply chain, China has become an existential and ideological challenge for the United States. This is reflected in the competition between the *State-Controlled Techno-Capitalism* led by the Chinese Communist Party and the *Coordinated Free Market Democracy* under U.S. leadership. As a result, China has become a *strategic rival* for the United States, similar to the way the Soviet Union was during the Cold War.

Undoubtedly, this challenge posed by China has led the United States to impose restrictions on the export of advanced semiconductors, semiconductor manufacturing equipment, advanced computing capabilities, and supercomputers. Furthermore, these restrictions limit the transfer of knowledge in the semiconductor field, as well as consultancy services provided by U.S. citizens to Chinese companies. Foreign companies exporting or manufacturing advanced semiconductors in China using U.S. technology are also subject to these restrictions.

In this new context of geopolitical and technological confrontation between China and the United States, Japan is seeking to revitalize its domestic semiconductor manufacturing industry with the aim of becoming a global manufacturing hub once again. In this regard, I would like to highlight some excerpts from the "Strategy for Semiconductors and the Digital Industry" outlined by Japan's Ministry of Economy, Trade and Industry:

"1. Basic concepts

(2) In order to ensure Japan remains strategically essential and strategically independent amid the conflict for technological hegemony between the U.S. and China, it will promote consolidating the digital industry's fundamental functions provided by businesses based in Japan. Japan will also establish a position in which it will play a central role in and contribute to the global supply chain.

3. Directions to follow regarding the semiconductor field

(1) Securing the semiconductor production and supply capacity the nation will require

- Cutting-edge logic semiconductors are the fundamental devices that control all society's electronic systems and support the data-driven economy. They are important as the 'brains of industry,' but are a missing piece for Japan. In order to strengthen strategic independence regarding economic security, it is necessary to secure the foundations of domestic manufacturing through, for example, establishing joint venture factories with overseas foundries. In addition, domestic production with next-generation manufacturing technologies will be advanced."*

Japan's strategy clearly recognizes the context of technological confrontation between the United States and China, emphasizing the central role that Japan aspires to play in the global semiconductor supply chain. Furthermore, it highlights the strengthening of domestic production through strategic alliances with foreign manufacturers, which marks a significant shift from Japan's predominant strategy in the 1970s. The previous strategy promoted a self-sufficient vertical structure of domestic production and restricted foreign companies' investment and participation.

Additionally, the new strategy includes a substantial financial subsidy package from the Japanese government totaling 13 billion dollars (2 trillion yen). This government support has attracted renowned foreign companies in the global semiconductor industry, such as Taiwan Semiconductor

Manufacturing Company (TSMC), Powerchip Semiconductor Manufacturing Corp. (PSMC, Taiwan), Samsung (South Korea), Micron Technology (USA), Intel (USA), IBM (USA), Applied Materials (USA), ASML (Netherlands), among other industry leaders.

According to the Center for Strategic and International Studies, this new approach suggests a close cooperation between Japan and the United States, reflected in the "Basic Principles on Semiconductor Cooperation" agreed upon in the first meeting of the Japan-U.S. Commercial and Industrial Partnership in 2022. Semiconductor cooperation also involves Taiwan and South Korea, both members of the U.S.-East Asia Semiconductor Supply Chain Resilience Working Group (also known as "Fab 4"), a semiconductor alliance established in 2023 under the leadership of the United States.

This new paradigm has the potential to turn Japan into a massive semiconductor hub for a wide range of applications, leveraging each country's strengths, such as advanced chip design from the USA, advanced and older-generation chip manufacturing and packaging from Taiwan and South Korea, chip manufacturing materials and equipment production from Japan, as well as extreme ultraviolet lithography equipment technology for the production of 5 to 7 nanometer and smaller semiconductors from the Netherlands.

All indications point to the threshold of a new global semiconductor ecosystem centered around Japan and led by the United States, which will compete with the emerging semiconductor ecosystem in China.

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Notes

Many thanks to Mrs. Ayana Díaz Hatada for translating this article into Japanese.

My opinion articles are food for thought and are intended for family, friends, acquaintances, and ordinary citizens. The goal is to encourage reflection and stimulate discussion on current topics.

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