

China's Technology Ambitions Could Upset the Global Trade Order

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BEIJING — When President Trump arrives in Beijing on Wednesday, he will most likely complain about traditional areas of dispute like steel and cars. But Washington officials and major global companies increasingly worry about a new generation of deals that could give China a firmer grip on the technology of tomorrow.

Under an ambitious plan unveiled two years ago called **Made in China 2025**, Beijing has designs to dominate cutting-edge technologies like advanced microchips, artificial intelligence and electric cars, among many others, in a decade. And China is enlisting some of the world's biggest technology players in its push.

Sometimes it demands partnerships or intellectual property as the price of admission to the world's second-largest economy. Sometimes it woos foreign giants with money and market access in ways that elude American and global trade rules.

When concerned officials in Washington began blocking China's ability to buy high-end technology last year, one American company found a way to help its Chinese partner around

those limits. The company, Advanced Micro Devices, avoided scrutiny by licensing its exclusive microchip designs, rather than selling them.

The Chinese partner got access to the technology to make its own products. Advanced Micro Devices got a big payout.

The rules of global commerce are changing — and China and the United States are racing to create a future that aligns with their own distinct visions. The result could be an overhaul of 20th-century trade rules for a 21st-century global economic order, in which money, ideas and influence could become as closely watched and tightly regulated as hard goods packed on a ship and sent abroad.

Even before the Communist Revolution, China obsessed about absorbing foreign technology as a way to end a century of humiliation and restore its national strength. But Made in China 2025 is more ambitious than anything the government has ever attempted, a national industrial policy that aims to project a new type of global might and influence.

China is directing billions of dollars to invest in research at home as well as to acquire innovative technology from abroad. A Beijing-directed semiconductor fund is thought to have more than \$100 billion at its disposal, while another plan aims to grow China's artificial intelligence companies into a \$150 billion industry by 2030.

Such efforts have some American government officials and business leaders calling for a rethinking of how the United States approaches trade. Lawmakers are pushing for tougher rules on technology purchases, which do not usually cover the types of deals that China increasingly prefers. Officials are also investigating whether China is stealing intellectual property.

“There are a few U.S. companies that have been leaning too far about sharing technology with countries that are potential enemies of ours,” said Wilbur L. Ross Jr., the United States secretary of commerce, in September remarks regarding information technology that were widely seen as referring to China.

“I don’t think that’s a very good idea. I think it’s the ultimate short-termism to give up very valuable I.T. in order to get a few quarters or a few years of improved sales.”

Robots and Rice Cookers

China looks to the West for much of its technology. Even some of its most sensitive systems that run government computers, banks and laboratories use chips from Intel and Qualcomm and software from Microsoft or Oracle, a dependence it sees as a long-term vulnerability.

The government hopes to change that. It is backing the effort with money: \$45 billion in cheap loans for its companies, \$3 billion for advanced manufacturing efforts and billions

more in other financial support, according to the Mercator Institute for China Studies, a German think tank.

Made in China 2025 “is going to have substantial resources and focus devoted to it, especially at the local government level,” said Kai-Fu Lee, a prominent venture capitalist in Beijing.

The goal is not simply to beat the United States. China is preparing for a day when cheap manufacturing no longer keeps its economy humming. It wants to embrace industries offering skilled jobs that do not blacken its skies and cloud its rivers.

The plan itself has specific targets and quotas. By 2025 it envisions China meeting nearly three-quarters of its own demand for industrial robots and more than a third of its demand for smartphone chips. Other targets cover new-energy cars, like electric cars, and high-performance medical devices.

The template for Made in China 2025 was cribbed from a German government plan called Industrie 4.0, which calls for greater automation and the growing use of “smart factories” doing sophisticated work with fewer people. And the deal that woke up the world to China’s plan was a German one.

Last year, a Chinese appliance maker called Midea struck a surprise \$3.9 billion deal to acquire Kuka, an advanced robotics company in Germany. The deal made Midea — best known for its refrigerators and rice cookers — a major player in automation.

“Our partnership with Kuka is actually about whole factory solutions,” said Irene Chen, a spokeswoman for Midea.

Where technology cannot be purchased, the government wants Chinese companies to extract it from foreign firms through deals or tough new laws.

China will soon require foreign auto companies to make electric cars there if they want to continue selling gasoline-powered vehicles in what is now the world’s largest car market. General Motors, Volkswagen and others have been scrambling to form joint ventures with Chinese partners to do so.

Cybersecurity laws enacted this summer give the Ministry of State Security the power to conduct security reviews of technology sold or used in China, said James A. Lewis, senior vice president of the Center for Strategic and International Studies. Such a step could require companies to expose some of their most valuable secrets.

At some companies, Chinese security officials conduct the inspections in corporate “clean rooms” in the United States, with the Chinese officials traveling on business visas, Mr. Lewis said. The companies argue that the access takes place under controlled circumstances that limit what Chinese officials might learn.

“If American companies have a big market in China, they say to the Ministry of State Security, ‘Come in,’” Mr. Lewis said. “Everyone fears retaliation. No one wants to lose the China market.”

Old Rules, New Products

Wary of the push, the United States has used existing rules to stop Chinese purchases of foreign businesses in areas important to national security.

But many of those tools **do not apply to today’s deals**, as A.M.D.’s Chinese pact shows.

A.M.D.’s joint venture with its Chinese partner can be found in a gleaming industrial area of the city of Chengdu called Tianfu Software Park.

The park represents Beijing’s vision of the future. Trees and sidewalks jammed with ride-sharing bikes sit beneath a vast strip of office towers, hotels and apartment complexes. Offices of China’s most innovative companies, like Huawei and Tencent, sit next to outposts of their foreign analogues, like SAP and Accenture.

Inside one of its glass towers, A.M.D. works with its Chinese partner, a company called Sugon, to produce new chips.

Under the nearly \$300 million deal, A.M.D. agreed to license chip technology to a Chinese joint venture with Sugon to make chips for servers. Because A.M.D. controls that joint venture, the technology is considered to remain in American hands.

But A.M.D. struck a second partnership that the Chinese company controls. That joint venture works on applications such as integrating the chips with servers. The two ventures are on the 11th and 12th floors of the same building.

Experts say the dual partnerships could help China develop a new generation of powerful supercomputers. China already makes **the world’s fastest computers**, but they run on homegrown chips that cannot read commonly available software for supercomputers. With A.M.D.’s help, experts say, Sugon could develop chips that could make China’s supercomputers more versatile and adaptable and replace those from foreign firms.

“We have worked closely with and been very clear with U.S. government officials on the strategy and specifics of the technology, which is classified as permitted for export,” an A.M.D. spokesman said in an emailed statement. He added that the processors are also lower performing than other options that A.M.D. sells in America.

Executives in Chengdu said there was a firewall between the two joint ventures, and the one outside of A.M.D.’s control was not involved in chip development.

Yet in an interview with the Chinese state news media, Zhang Yunquan, a top government researcher and head of the National Supercomputing Center in Jinan, China, **said that Sugon**

could use the work of the joint venture to make supercomputer microchips. Such a supercomputer would be crucial in designing next-generation weapons systems, according to experts.

“When they first announced the partnership I was shocked,” said Stacy Rasgon, a semiconductor analyst with Sanford Bernstein.

“You would think intellectual property and joint ventures would belong under Cfius review,” Mr. Rasgon said, referring to the Committee on Foreign Investment in the United States, which reviews foreign deals. “It should. It’s surprising it isn’t.”

New Rules for a New Era?

For some in the Trump administration, an 18-year-old book by two Chinese Air Force colonels has become required reading.

Called “Unrestricted Warfare,” the book argues that China does not need to match the United States militarily. Instead China can take advantage of the global economy and the internet to take down its main rival.

Some American officials see in it a guide to China’s plan. Some United States lawmakers are proposing to toughen American takeover laws to evaluate deals on an economic as well as a national security basis. They are also pressing for reviews of licensing agreements and joint ventures. The United States trade representative has also launched an investigation into whether Chinese companies are stealing intellectual property.

“There’s concern that U.S. firms are transacting away their competitive advantages,” said Greg Levesque, managing director of Pointe Bello, a research firm in Washington, and a former executive at the US-China Business Council.

Such changes could ripple through the tech world. Chinese investment often means more money with fewer strings attached. Some tech companies say that is good for innovation. China’s spending on science and research is also growing at a time when the United States government and others are cutting back.

Still, many American companies fear the deck is stacked against them. The United States long believed bringing China into the World Trade Organization, which oversees global trade disputes, would ensure it would follow the rules. But the W.T.O. has proved ineffective when it comes to tech issues.

At a recent dinner event in Washington, an American technology executive held up a dinner plate to illustrate the size of the China market, said a person who was there who asked not to be identified because the event was not public. Then the American executive held up a wine coaster that represented the size of his firm’s business.

The message was clear: American companies are at risk of being muscled out of the market.

“Made in China 2025 seems to reject all notions of comparative advantage and future opportunities for high-value-added manufactured exports from the rest of the world to China,” said Jeremie Waterman, president of the China Center at the U.S. Chamber of Commerce.

“If Made in China 2025 achieves its goals,” he said, “the U.S. and other countries would likely become just commodity exporters to China — selling oil, gas, beef and soybeans.”