Beyond ‘Made in China 2025’

By Jingyi Li, Analyst and Portfolio Manager | April 30, 2025

In 2015, the Chinese government laid out a plan to remake the country’s industrial base. Called “Made in China 2025,” the initiative’s aim was to transform the nation from a hub of mundane assembly into a high-tech powerhouse of value-added manufacturing.

Shortly after the program launched I wrote about it in a letter to my colleagues: “Announced in early 2015, an ambitious plan called ‘Made in China 2025’ made a long list of products China wants to be partially self-sufficient in and win significant global market share. It ranges from aerospace engines to large harvesters, from computer chips to industrial control software, from high pressure steel to composite materials, from medical diagnostic and imaging equipment to antibody drugs. The targets include so many technical specifications that it is more like an R&D proposal than some government hot air.”

At the time, China’s biggest problems revolved around inefficient capital allocation, and the outdated development model that was unbalanced and unsustainable. So, a transformation of its economy was much needed. Made in China 2025, with a focus on ten key sectors including information technology, industrial machines and robots, biotech, transportation, and electric vehicles, was a plan to launch the country into the future. If they achieved even half of what they set out to do, I thought it would be a success. So, now that 2025 is here, how has it worked?

China has become the world’s biggest manufacturer of and market for electric vehicles. EV sales in China in 2025 are expected to total about 8 million cars; the US is second with only 1.4 million. BYD has become the largest EV manufacturer in the world and recently unveiled its latest game-changing innovations: a state-of-the-art advanced driver assistance system, or ADAS, free on most of its models and a five-minute charger. Not only are BYD’s cars comparable in quality to its competitors, they’re also better priced. Meanwhile, a high-powered prototype version of Xiaomi’s SU7 Ultra electric vehicle was one of the top preproduction cars at the famed Nürburgring race track in Germany. What’s really surprising is that Xiaomi is primarily known as a cellphone and appliances maker; it launched the SU7, its first model, in March 2024.

Chinese companies have also expanded rapidly in the biotechnology industry. Since 2007, when the first Chinese-developed drug underwent Phase II testing in the US—under

the regulations of the FDA—China's efforts have mushroomed. Between 2007 and 2023, there were 691 clinical trials of Chinese-developed drug candidates in the US; 82% of those trials occurred between 2019 and 2023. A Chinese biotech named Akeso released results in September 2024 for a cancer drug that was on par with the efficacy of Merck's mega-blockbuster Keytruda. In 2019, none of the molecules licensed by large pharmaceutical companies came from China. By 2024, 30% did.

A key factor making all this possible is China's long-term commitment in education and indigenous R&D. There is today a pipeline of young, educated researchers creating the theoretical breakthroughs that result in commercial products years or even decades later.

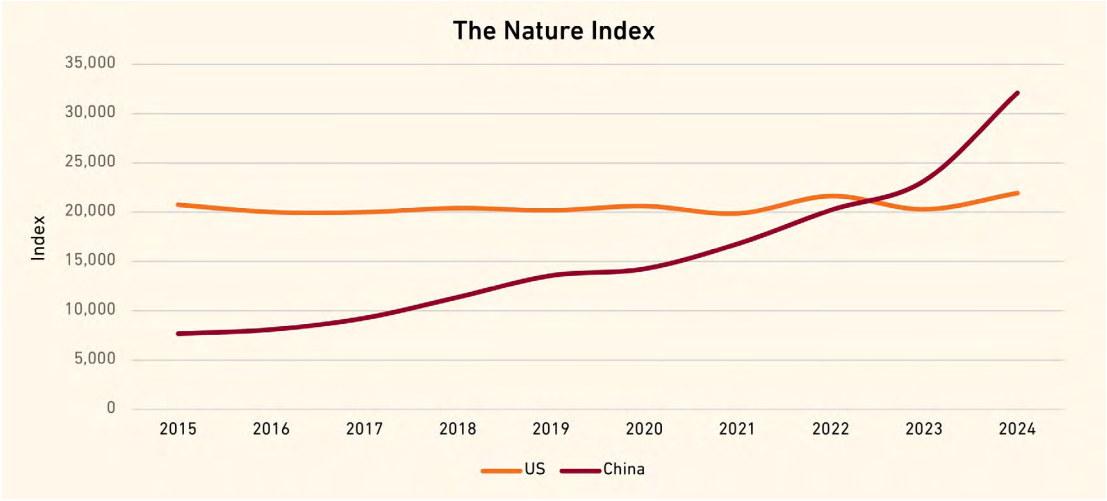
An emerging field where China has a commanding lead is humanoid robots. In 2023, the government issued a roadmap and aggressive timeline to force this field into commercialization. China planned for mass production in 2025 and maturation of the supply chain by 2027, with the goal of becoming an industry leader. China seems on track to achieve its goal, partly thanks to its success in localizing a critical component that had long been dominated by Japanese robotic makers, the compact precision gears needed in every robot joint. Thanks to a robust ecosystem and supply chain of components suppliers, originally built for the car industry and the home-appliance industries, companies such as Sanhua Intelligent Controls and Shuanghuan Driveline have evolved to become key players in the humanoid-robot ecosystem. Goldman Sachs estimated that by 2035 there could be annual sales of 1.4 million robots a year in a US$38 billion market. Much of that will be Chinese.

Looking back, I'd say China has in fact achieved well over half of its goals. China's abilities have advanced from just producing other countries' clothes and toys to competing directly in a range of critical, high-tech, and high-value industries, including industrial robots, electric vehicles, solar energy, biotech, and others.

But what is most impressive is that the culture created by the Made in China 2025 plan has resulted in a more innovative culture overall. The most recent high-profile example of China's ability to innovate came in January when a little-known company named DeepSeek unveiled an AI chatbot that virtually matched the capabilities of western AI models and, just as critically, did so requiring only a fraction of the computing power. While DeepSeek has grabbed most of the attention, AI models from several other Chinese companies such as Alibaba have also scored well on industry benchmarks.

Looking at the horizon, one might expect more "DeepSeek moments" in other fields. SiCarrier Technologies, a Chinese semiconductor equipment maker founded in 2021, debuted a full series of new equipment, from etching to atomic-layer deposition, at the SEMICON China exhibition last month. It joined a long list of Chinese semiconductor-equipment makers that have been working to localize the entire supply chain in the face of US restrictions. While China's chip-making capabilities have a long way to go to reach the level of industry leaders such as ASML on the most advanced kinds of chips, it has closed the gap in other areas of chip making. China has also unveiled a quantum computer that operated a million times faster than Google's, and a fusion reactor called "artificial sun" that set a world record by operating for 17 minutes. That broke the record set by...the same reactor.

These achievements reflect China's pivot from an innovation model led by private companies, which focused mainly on consumer technologies, to a state-directed, whole-of-nation approach, with a sharper focus on areas with national security implications. A key factor making all this possible is China's



Source: The Nature Index. Data as of date: Dec. 31, 2024.

Note: The Nature Index, compiled by the publisher of Nature magazine, tracks research articles published in most reputable natural-science and health-science journals and ranks the total contributions by institution or country/region. Its primary metric, called "share" and shown in the above chart, assigns fractional counts based on the different affiliations of multiple authors of each article.

long-term commitment in education and indigenous R&D. There is today a pipeline of young, educated researchers creating the theoretical breakthroughs that result in commercial products years or even decades later. More than 11 million Chinese students graduated from college last year, up from 7.1 million in 2014 and only 2.4 million in 2004. China produces 3.6 million graduates annually in STEM fields (science, technology, engineering, and mathematics), more than any other country. The US is third, with 820,000, out of a total of 4.1 million college graduates annually. As I warned in 2017, "just as older and less-educated labor from China disrupted the low-end of the global labor pool in past decades, the younger and better-educated generation in China is now disrupting the middle class of the developed world."

China's gross domestic expenditure on R&D has surged in the past decade, according to the Organization for Economic Co-operation and Development, and is now neck-and-neck with the US. In terms of the results from R&D and basic scientific research, one indicator to watch is The Nature Index, which tracks articles in the top 145 natural-science and health-science research journals. It's a good way to track the productivity of research institutions (mainly universities but also companies and research labs) conducting fundamental research. In 2014, China's Nature Index ranking was a distant second to the US. In 2024, China surpassed the US as the top nation on the Nature Index, and nine of the top ten institutions were Chinese.

To be sure, this doesn't mean China is destined to dominate the 21st century. It is still a hybrid economy in the midst of a change, and the drag from its badly warped capital markets still hampers its potential. And for all its impressive achievements over the last decade, its industries have largely reached parity with its competitors, not surpassed them. The point is not that the race is over, it's that the race has changed. In effect, China has put scores of companies in myriad industries—and even entire nations—on notice that they are now in a proverbial Red Queen's Race. Companies and countries can't just maintain their old pace of production and innovation. If they want to get someplace, as the Red Queen warned Alice in Lewis Carroll's *Through the Looking Glass*, they are going to have to run twice as fast.

China's newfound abilities may stoke fears among western nations, much as Japan's rapid ascendency did two generations ago. That would be the wrong reaction. They might find the view by JPMorgan CEO Jamie Dimon advisable. As he wrote in his latest annual letter to shareholders: "We do not need to fear China, we just need to get our act together."

Disclosures

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