

8.2 Techno-Nationalism

"Made in China 2025" is an initiative to comprehensively upgrade Chinese industry. The initiative draws direct inspiration from Germany's "Industry 4.0" plan, which was first discussed in 2011 and later adopted in 2013. The heart of the "Industry 4.0" idea is intelligent manufacturing, i.e., applying the tools of information technology to production. The plan was drafted by the Ministry of Industry and Information Technology (MIIT) over two and a half years, with input from 150 experts from the China Academy of Engineering.¹³⁰¹

China's State Council yesterday unveiled the "Made in China 2025" plan, 10-year national guideline, aiming to transform China from a big manufacturing country to a powerful one. The plan also sets three timelines - 2025, 2035, 2049 - for China to become a powerful manufacturing country, middle-level world manufacturing power and top world manufacturing power respectively.¹³⁰²

13th Five Year Plan for Economic and Social Development of People's Republic of China (2016-2019) targets 10 key sectors which are given in **Chapter 22 Develop China into a Manufacturing Powerhouse, Section 6 Lower Business Costs in the Real Economy:**

1. Aerospace equipment
2. Marine engineering equipment and high-tech vessels
3. Advanced rail transit equipment.
4. High-grade CNC machine tools
5. Robotics
6. Modern agricultural machinery and equipment.
7. A complete set of advanced chemical machinery.

In addition three key points included in Chapter 23 *Develop Strategic Emerging Industries Section 4: A Better Environment for Developing Emerging Industries*

8. Innovation in next generation information technology industries
9. Development of the biotech industry
10. New Energy Vehicles.¹³⁰³

The Chinese government has pursued comprehensive, long-term industrial strategies to build internationally competitive domestic firms and replace foreign technology and products with those designed and made by Chinese companies first at home, and then abroad.¹ This state-led approach is enshrined in the "Made in China 2025" strategy—the government's industrial blueprint designed to transform China into a technological powerhouse.* The Chinese government's toolbox includes localization targets, massive state funding for industry development, government procurement and research and development (R&D), China-specific standards, foreign investment restrictions, recruitment of foreign talent, state-directed acquisition of foreign technology and intellectual property, and, in some cases, industrial espionage (see Table 1).¹³⁰⁴

¹³⁰¹<https://www.csis.org/analysis/made-china-2025>

¹³⁰²<https://gbtimes.com/made-china-2025-plan-unveiled-boost-manufacturing>

¹³⁰³https://en.ndrc.gov.cn/newsrelease_8232/201612/P020191101481868235378.pdf

¹³⁰⁴<https://www.uscc.gov/sites/default/files/Research/China's%20Technonationalism.pdf>

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More recently, China has been leveraging the openness of the United States and other market-based economies to gain access to advanced research and data, recruit a globally talented workforce, acquire and invest in leading-edge firms through Chinese state financing, and freely sell their products and services abroad. The scale and volume of government resources directed toward these sectors severely limits the ability of foreign firms to compete fairly in China’s market, and creates distorted global and domestic market conditions.¹³⁰⁵

Table : China’s Industrial Policy Toolbox

Policy Tool	Description
Localization Targets	Within its industrial plans, the Chinese government sets targets for domestic and international market share that should be held by local technology and production, such as increasing Chinese companies’ share of the domestic industrial robot market to 70 percent by 2025.
State Funding for Industry Development	The central government provides national investment funds, subsidies, tax breaks, preferential loans, export subsidies and guarantees, and other forms of financial support to develop national champions in strategic sectors. For example, in the solar sector, China’s Ministry of Finance subsidized 50 to 60 percent of production costs of select solar companies, and 50 to 70 percent of installation costs for solar generation and distribution systems. Local governments, which account for the largest share of financial aid, provide additional support to local champions. At least 21 cities and five provinces have pledged a combined \$6 billion in subsidies for robotics. These subsidies account for an estimated 10 percent of total operation revenue for Chinese robotics firms Siasun and Estun. Local governments are also subsidizing between 15 and 30 percent of the purchase price of robotics to encourage greater usage. Designated national champions also received advantageous capital terms from state-owned banks and investment funds (e.g., wind turbine manufacturer Goldwind

¹³⁰⁵<https://www.uscc.gov/sites/default/files/Research/China's%20Technonationalism.pdf>

	received a \$5.5 billion loan from the state-owned China Development Bank).
Government R&D Funding	The Chinese government provides significant R&D funding to strategic sectors. From 2005 to 2015, total government R&D spending grew more than 350 percent to reach \$44.5 billion. China's R&D expenditures are rapidly catching up to the United States, with China's total R&D spending (public and private) increasing from 26.5 percent of total U.S. R&D expenditures in 2005 to 75.1 percent in 2015.
Government Procurement	The Chinese government leverages its large central and local government procurement markets to benefit domestic firms in strategic sectors. For example, in 2012, the central government mandated its agencies to purchase only Chinese automobile brands, leading several municipal and provincial governments to follow suit
Technology Standards	The Chinese government has repeatedly created China-specific standards to raise the costs of market entry for foreign firms. For example, the People's Bank of China announced a new technical encryption standard for bank cards—incompatible with existing international standards and only used by the state owned China UnionPay—effectively cutting foreign electronic payment firms such as Visa and MasterCard out of the market and forcing them to spend additional money to redesign their cards to meet the standard
Regulations	The Chinese government advantages domestic firms by setting high regulatory thresholds for market entry and creating vague regulations that allow for discretionary enforcement and interpretation to favor domestic firms. In the automobile sector, for instance, the government requires foreign firms to form joint ventures with state-owned firms as the price of market entry.

<p style="text-align: center;">Foreign Investment Restrictions and Import Guidance</p>	<p>Through its Catalogue on Guiding Foreign Investment and Catalogue on Encouraged Imported Technology and Products, the Chinese government directs foreign investment and technology imports toward strategic sectors by designating industries as either “encouraged,” “permitted,” or “restricted” to foreign investment. Foreign investment in targeted sectors is first welcomed to build domestic capacity, but after domestic firms become competitive, the government gradually restricts this investment to provide a protected market for domestic firms. For example, the automobile industry shifted from “encouraged” in 1994–2010 to “permitted” in 2011–2014 to “restricted” in 2015.</p>
<p style="text-align: center;">Foreign Talent</p>	<p>The Chinese government is recruiting overseas Chinese and foreign academics, experts and entrepreneurs in strategic sectors to come teach and work in China, most notably through its Thousand Talents Program and Project 111. The Thousand Talents Program was launched in December 2008 and has brought more than 4,000 foreigners to China’s scientific laboratories, companies, and research centers. The Chinese government also uses research and startup funding to incentivize foreign experts and entrepreneurs to split time between their positions overseas and in China. Project 111 was launched in 2006 to recruit 1,000 foreign experts in strategic sectors from the world’s top 100 universities and research institutes.</p>
<p style="text-align: center;">Acquisition of Foreign Technology</p>	<p>The Chinese government encourages Chinese companies in strategic sectors to expand their global market access and gain ownership of key foreign technology, intellectual property, and assets. Under the 13th Five-Year Plan (2016–2020), hundreds of government-controlled venture capital funds with combined endowments worth at least \$325 billion support Chinese companies in these strategic industries and enable them to pursue foreign acquisitions. For example, the National Integrated Circuit Industry Investment Fund (with at least</p>

	\$17.9 billion in endowment) has been instrumental in providing financing for the rapid increase in domestic capacity and acquisitions abroad. In 2015–2016, Chinese firms attempted or completed at least 21 acquisitions of U.S. semiconductor companies
Industrial Espionage	The Chinese government continues to conduct pervasive industrial espionage against U.S. companies, universities, and the government, and to direct efforts to circumvent U.S. export controls to gain access to cutting-edge technologies and intellectual property in strategic sectors.

Source: Adapted from U.S.-China Economic and Security Review Commission, “Chapter 4, Section 1: China’s Pursuit of Dominance in Computing, Robotics, and Biotechnology,” 2017 Annual Report to Congress, November 2017, 511–515; U.S.-China Economic and Security Review Commission, “Chapter 1, Section 3: China’s 13th Five-Year Plan,” 2016 Annual Report to Congress, November 2016, 151, 156– 160.

8.3 Gross Domestic Expenditure on R&D

UNESCO Report on China’s R&D

Financial Resources		Human Resources	
R&D spending as % of GDP	2%	Number of researchers per million inhabitants	1080
R&D spending in PPP\$	\$372,326.1M		

Source: UNESCO R&D Spending

URL: <http://uis.unesco.org/apps/visualisations/research-and-development-spending/>

UNESCO Report on China’s R&D spending by sector of performance

R&D spending by sector of performance	
Business	\$287,795.3M
Government	\$58,838.4M
Universities	\$25,692.4M

URL: <http://uis.unesco.org/apps/visualisations/research-and-development-spending/>

OECD Data: China’s Gross domestic spending on R&D Total, % of GDP, 2000 – 2018

Year	China
2000	0.893
2001	0.940
2002	1.058