The Big Read Chinese business & finance

The lessons from China’s dominance in manufacturing

Beijing’s aggressive investments in domestic production have strained trade relations with western partners. But can the world learn from it?

Joe Leahy and **Nian Liu** in Beijing and **Ryan McMorrow** in Changchun

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For anyone seeking to gauge the success of Beijing’s flagship “Made in China 2025” industrial policy, German automaker Audi’s new electric vehicle plant in northern China provides a vivid example.

Industrial robots from Chinese-owned companies — one of the key targets of the policy — dominate the production line, starting with an automated press that stamps metal sheets into door panels.

Next, more than 800 robots from Chinese-owned Kuka weld pieces into car frames, while another Chinese supplier has automated the wheel installation process. The robots outnumber the humans on each shift.

“We weren’t expecting to automate so many processes in China, but the Chinese suppliers’ pricing is very low,” says Tobias Liebeck, Audi’s head of manufacturing engineering at the Changchun plant. China now has more robots per 10,000 workers than Germany.

Launched by Beijing a decade ago with the aim of dominating 10 advanced industries, the Made in China plan sought to achieve 70 per cent domestic market share across Chinese manufacturing in “core basic components and key basic materials” by this year.

The Audi plant in Changchun. Tobias Liebeck, head of manufacturing engineering at the plant, says the company is automating processes in China because 'suppliers' pricing is very low' © Audi AG

In addition to robots, the other target sectors ranged from advanced rail equipment, high-tech maritime vessel manufacturing, and aerospace and aviation equipment to electric vehicles and next generation information technology.

The policy marked a historic turning point not only for Chinese manufacturing but for the global economy. The Made in China plan helped create a massive rupture in Beijing's trade relations with western partners and has shaped how modern governments think about industrial policy.

Trading partners criticised its market share targets as mercantilist. US President Donald Trump used the plan to help justify his trade war with China during his first term, levying $50bn of tariffs directly targeting sectors benefiting from Made in China. His successor Joe Biden also pursued a more active US industrial policy, especially around microchips and green technology.

Beijing's targeting of industries in which the EU specialised, from machine tools to automotives and advanced shipping, directly contributed to growing trade tensions with Europe. The plan has also been criticised for creating overcapacity in the world's second-largest economy.

But despite the political controversy, two recently released reports on the Made in China programme, from the European Union Chamber of Commerce in China and the Washington-based Rhodium Group on behalf of the American Chamber of Commerce, suggest Beijing has achieved its key goal — modernising a manufacturing sector that once relied entirely on cheap labour.

Most European companies operating in 'Made in China 2025' sectors find themselves at a disadvantage in terms of competition and market access

In the sector you selected, has your company experienced a more unlevel playing field since 2015?*

Response	Share of respondents (%)
Yes, public and government procurement customers prefer Chinese brands more than before	25
Yes, our Chinese competitors benefit from subsidies that we cannot obtain	21
Yes, informal market access barriers have expanded, putting us at a disadvantage to Chinese competitors	20
Yes, private customers prefer Chinese brands more than	

before	12
Yes, due to new localisation requirements being introduced	11
Yes, formal market access barriers have expanded, putting us at a disadvantage to Chinese competitors	10
Yes, new Chinese standards give a greater advantage to Chinese competitors	10
Yes, China's new data regulations put us at a disadvantage to local competitors, as we are forced to maintain separate data and/or IT systems for China	7
Yes, China's IPR regime favours local companies more	6
No, the playing field has become more level	12
No, there has been no significant change	28

FINANCIAL TIMES Source: European Union Chamber of Commerce in China • *survey conducted Dec 2024-Jan 2025; excludes answer 'other'; multiple answers possible

Using a unique combination of industrial policy, subsidies and other state support coupled with private sector entrepreneurialism and ferocious competition in China's vast market, the country was able to sharply increase the share of Chinese producers domestically and internationally in many of the sectors, in some cases matching or exceeding foreign competitors' technology.

The strategic aim of China's industrial policies — to build supply chain self-reliance to resist western interference while encouraging foreign dependencies on China — was put to the test this month when President Xi Jinping stood his ground against Trump in their tit-for-tat trade war. The US president ultimately backed down, reducing tariffs that had risen to as high as 145 per cent. In the view of many analysts, the US perhaps realised that it needed Chinese imports too much to risk an embargo.

"It was Chinese exports that were the weapon," says Gerard DiPippo, acting associate director of the Rand China Research Center. "[China] was able to arguably fight the US to a draw through . . . export dominance. From a national security perspective, that very much feeds into Xi's worldview."

This export dominance means that governments around the world are closely examining Made in China's legacy. They are trying to understand the extent of resources that Beijing has put into its plans and whether the sorts of tools and measures used can be replicated elsewhere.

The world is waking up to the competitiveness concerns that the

They also want to assess whether they need to take more steps to defend themselves from the growing competitive threat of

US was maybe the first to recognise

Chinese manufacturing, including through protectionist measures.

This is particularly true given that Beijing is now trying to use the same formula to target the technologies of the future, from advanced semiconductors and artificial intelligence to AI-enabled machines and humanoid robots.

"The world is waking up to the competitiveness concerns that the US was maybe the first to recognise," says DiPippo. "I think there is a backlash coming."

"There's no one now that compares to China when it comes to manufacturing," says Jens Eskelund, EU Chamber of Commerce in China president, noting that it accounts for 29 per cent of global manufacturing value added.

"So if the goal of 'Made in China 2025' was to establish China as the globally leading manufacturing nation, it is mission accomplished. But we need to realise that this success has not come without problems."

Powerful countries must have strong manufacturing sectors — that was the message from Beijing when the country's former premier Li Keqiang launched Made in China 10 years ago.

"The history of the rise and fall of world powers and the history of the struggle of the Chinese nation has repeatedly proved that without a strong manufacturing industry, there will be no country and no nation," the official notice of the plan said in its introduction.

Its purpose, says Li Menggang, dean of the National Economic Security Research Institute at Beijing Jiaotong University, was to drive China's transformation from a "large manufacturing country" to a "strong manufacturing country".

Not only was the plan more comprehensive than earlier industrial policy programmes, it came with detailed targets for market share, domestic self-sufficiency and technological development.

The strategy marshalled many of the tools easier to mobilise in an authoritarian Communist party-led state like China. Nearly 800 state-guided funds, with a combined value of Rmb2.2tn by 2017, were established to support favoured industries.

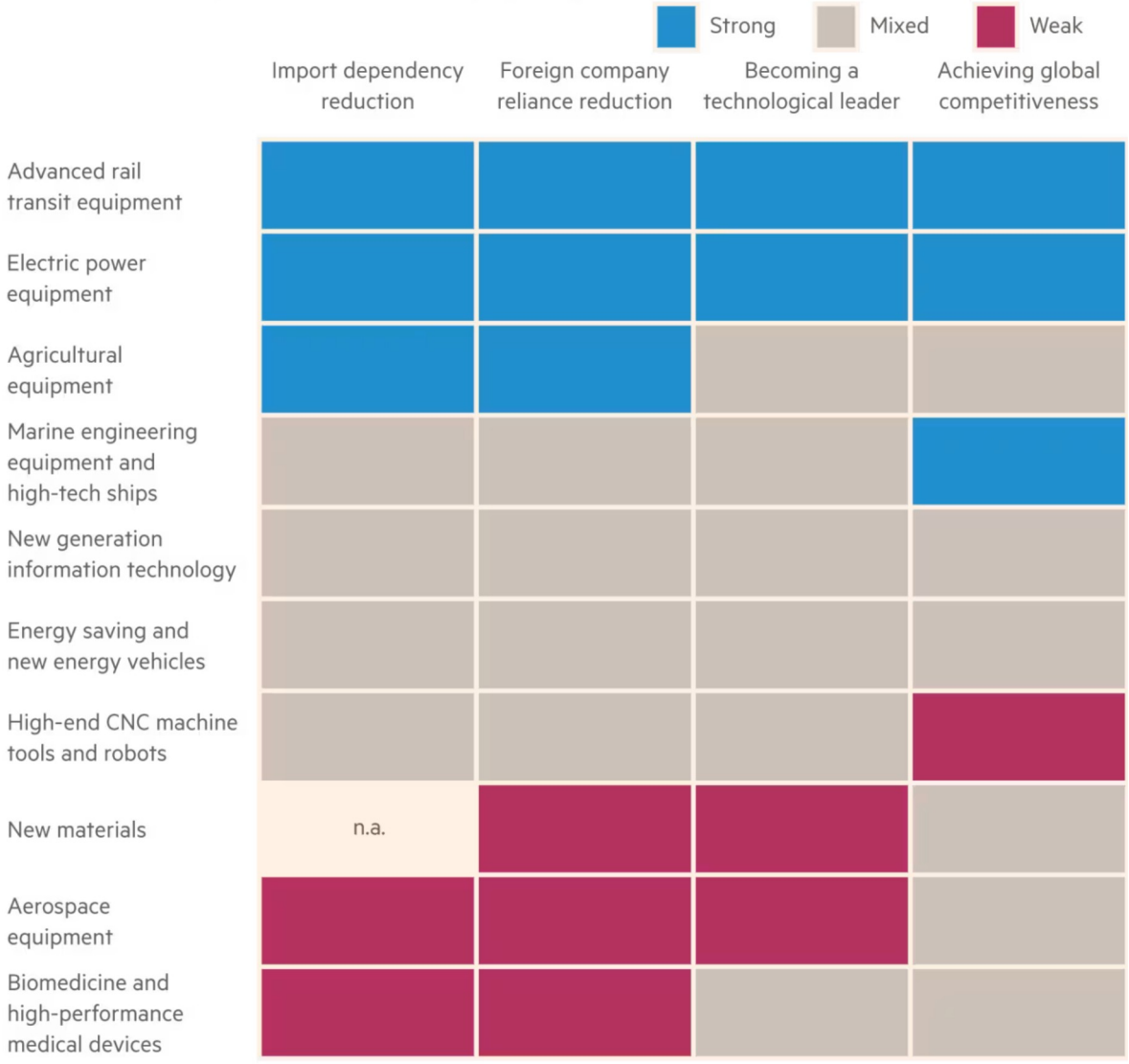
Tax benefits for innovation rose by an average annual rate of 28.8 per cent between 2018 and 2022, and the proportion of companies enjoying additional deductions

and tax reductions more than quadrupled between 2015 and 2023, Rhodium says. State investment through government guidance funds increased more than fivefold between 2015 and 2020.

Chinese companies received state support to buy out overseas companies to tap foreign technology, state-owned enterprises were combined to form national champions in telecommunications, aviation and smart manufacturing while smaller firms with innovative potential received heavy government funding.

Electric power and rail transit equipment have been the strongest performers under 'Made in China 2025'

Chinese industrial performance by sector, judged by four measures



Source: Rhodium Group, 'Was Made in China 2025 Successful' (May 2025); US Chamber of Commerce
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Market access was restricted for foreign firms, forcing them to enter joint ventures with local companies and offer technology transfer in sectors such as auto manufacturing, civil aviation and telecommunications.

"Foreign companies have been instrumental in enabling China to achieve its MIC2025 goals," the EU chamber report says.

Success was greatest in areas that required high amounts of capital, which Chinese firms could access in abundance through the state-dominated banking system, and in industries in which participants could benefit from China's huge market. Private sector participation was encouraged, which stimulated competition.

"I think the innovation in China is largely in the private sector," says Rand's DiPippo.

Foreign companies were incentivised to localise production, furthering Beijing's goal of embedding domestic supply chains. Rhodium's research shows that sales from US subsidiaries based in China have continued to climb even as US exports to the country stagnated.

"China has been very successful in reducing import dependencies but less so in reducing dependencies on foreign companies," says Camille Boullenois, co-author of the Rhodium report. She says many foreign companies located in China operate locally rather than exporting. "In a way, they're responsible for a huge part of its success," Boullenois says.

The Rhodium report rates the success of each industrial sector targeted in the plan according to four performance measures: reducing import dependence, cutting reliance on foreign companies, becoming a technological leader and achieving global competitiveness.

Rhodium rates only two of the 10 sectors — advanced rail transit equipment and electric power equipment — as strong across all four.

Another five have mixed or strong performances in the categories, including robots, machine tools, agricultural equipment and electric vehicles, while new materials, aerospace equipment and biomedicine and high-performance medical devices are weak or mixed.

But individual categories of equipment within industries can vary widely from the sector average.

For example, China set targets for the high-end Computer Numerical Control machine tools, the workhorses of manufacturing, of 70 per cent domestic company market share by 2020 and 80 per cent by 2025. Today, China has achieved self-sufficiency in low-end CNC machine tools and beat the target for mid-range machines, but for the high-end, Chinese companies only account for about 15 per cent.

Electric vehicles ready for export in Shanghai. China has enjoyed tremendous success in this area, as foreign carmakers' share of Chinese auto sales has dropped to a record low © CFOTO/NurPhoto/Reuters

China's new electric vehicle market is another area of success, growing from just 3 per cent of the broader automotive market in 2015 and forecast to be more than half this year. Meanwhile, foreign carmakers' share of Chinese auto sales has dropped to a record low of 31 per cent in the first two months of 2025, a loss of one-third of the market since 2020.

But areas that have proved challenging include civil aviation, which missed a target of 10 per cent by this year for the domestic market for aircraft, and semiconductors, which are making progress but are still lagging behind. Aviation in China is still dominated by Boeing and Airbus, while the most advanced chips come from Taiwan.

"The aircraft China is building are really western aircraft with Chinese metal over them," says Richard Aboulafia, managing director of AeroDynamic Advisory, an industry consulting firm, referring to the fact that the Chinese aerospace industry relies on foreign engines.

The EU Chamber in China report gave a similar ranking for technological leadership to the Rhodium report, giving advanced ship building, advanced rail equipment and new energy vehicles the highest marks, followed by agricultural machinery and electrical power equipment.

Yet measuring the plan's performance against China's targets fails to capture the programme's real purpose, says Max Zenglein, chief economist at Merics, a Beijing-based think-tank. "It misses the entire goal which [Made in China] is supposed to achieve, which is to become a manufacturing superpower."

China's advances in manufacturing have caused a series of problems, however — both for its economy and for the rest of the world. Critics say one of the main weaknesses is the propensity to produce market distortions — sometimes on a monumental scale.

Local governments, whose leaders are measured by their ability to deliver economic growth, latch on to new central government policies to attract subsidised industries to their areas.

The result is duplication and state-backed overcapacity supercharged by competition that drives prices down — good for consumers but not for corporate profitability or local government finances.

"We have seen these boom-and-bust cycles," says the EU Chamber in China's Eskelund, pointing to the solar and battery industries. "The government actually gives policy guidance and . . . everyone seems to be rushing in the same direction."

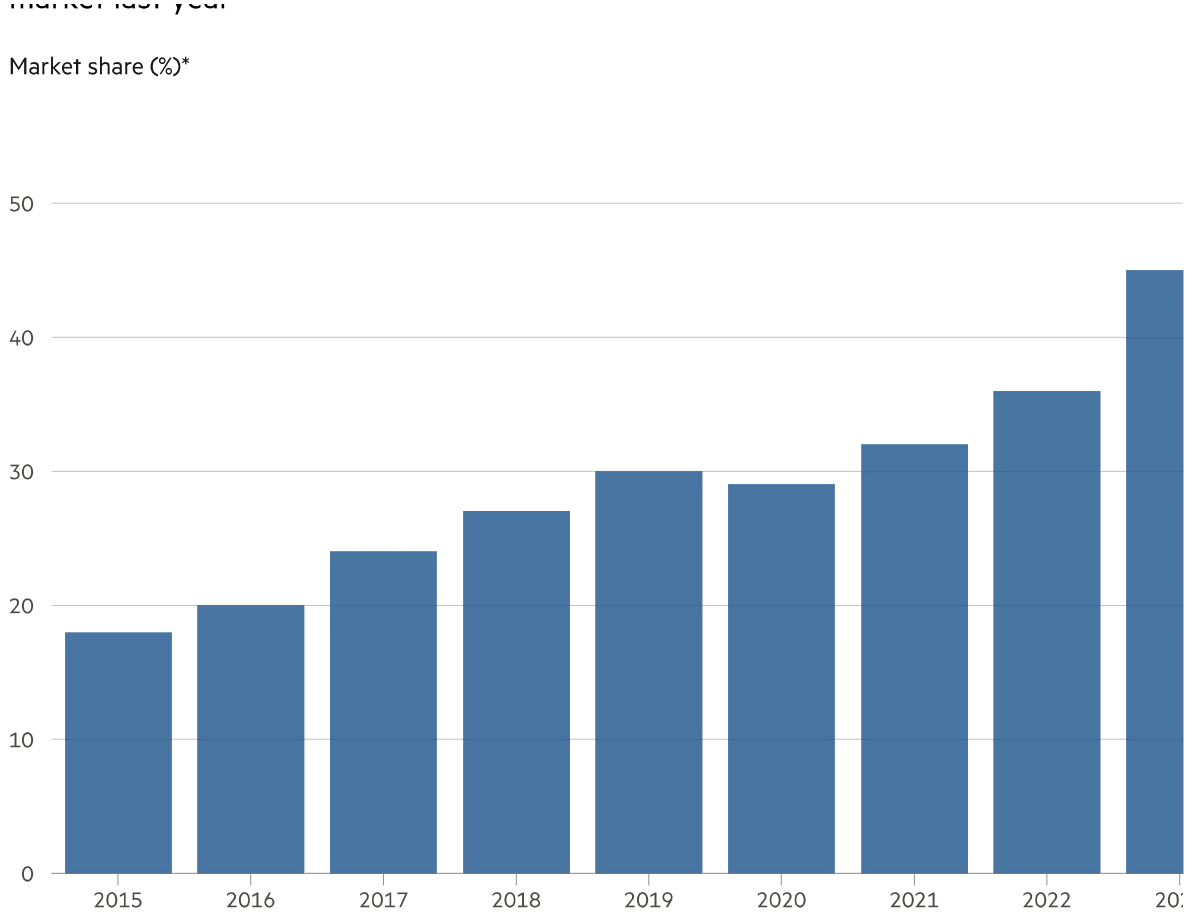
The EV sector was a case in point, he says, where only about three out of 112 manufacturers are making a profit. "We see waste at an absolutely colossal scale," Eskelund says.

Others question whether there is a direct link between Made in China and the country's manufacturing success.

Lee Branstetter, an economist at Carnegie Mellon University, and Guangwei Li at ShanghaiTech University, searched Chinese listed firms' financial reports for the words "Made in China 2025" between 2015 and 2018. Beijing stopped publicly mentioning the plan around 2018 after it became politically sensitive in relations with the US.

While few companies disclosed subsidies related to the plan, for those that did there was "little statistical evidence of productivity improvement or increases in R&D expenditure, patenting and profitability", Branstetter and Li wrote in a working paper for the National Bureau of Economic Research, a US non-profit.

Chinese manufacturers commanded a majority of the country's industrial robot market last year



Rand's DiPippo agrees that a lack of data in China sometimes makes it difficult to determine the effectiveness of its industrial policy. "It's like there's [a] black box where you know what the plan is, you kind of know what the inputs of policy support is, and you see the output, but you don't really know the causality in between," he says.

Other Chinese scholars say that industrial policy has served China well. "Technological leadership in certain sectors forms the foundation of China's participation in global competition and aligns with global development trends. In these areas, we will stay the course [on industrial policy]," says Li of Beijing Jiaotong University.

But industrial policy needed to be refined, he says. Market share targets, for instance, had their role in encouraging industries to scale up. But they could lead to overcapacity and resource misallocation.

In the future, policy would emphasise improving the value-added of entire industrial chains, rather than merely expanding scale, focusing on metrics such as R&D, the quality of patents and other standards to help "avoid blind expansion while guiding long-term competitiveness", Li says.

The focus on pumping resources into the supply side of China's economy also has

The focus on pumping resources into the supply side of China's economy also has had important macroeconomic side effects, analysts say, leading to a dependence on investment over consumption.

With the bursting of China's property bubble, the emphasis on supply-side industrial policy has left the country dependent on external demand to absorb its tremendous factory output.

"China should upgrade . . . to a 'China Market 2030' strategy," says Robin Xing, chief China economist at Morgan Stanley. "Which means they should focus on expanding the consumer market by delivering deeper social security reform, and building a social safety net for farmers and migrant workers so they can unlock China's high precautionary savings and boost consumption in a more sustainable way."

That would also help alleviate growing trade tensions with the US, Europe and developing countries over China's trade surpluses, which totalled nearly $1tn last year. "By doing that, they can probably offer a much bigger, stronger, more resilient domestic market for their own companies and for global companies," he says.

While China's manufacturing sector would continue to be dynamic and could receive a boost from artificial intelligence, the unprecedented increase in industrial policy funding over the past decade would be difficult to replicate in the next one, says Rhodium's Boullenois.

High debt levels, fiscal deficits and large numbers of lossmaking companies were weighing on public finances. She adds: "Beijing has sacrificed economic growth and productivity and probably long-term innovation for short-term gains."

Despite all these problems, however, China is showing no sign of giving up on industrial policy. If anything, Xi is intensifying the country's ambitions to lead on cutting-edge technology under the slogan "new quality productive forces".

This is essentially a deepening of Made in China, but with a greater emphasis on technological innovation, says Beijing Jiaotong's Li.

The next hot area is humanoid robots although some analysts worry that key breakthroughs in the technology are still years away and near-term commercial use remains limited.

A child shakes hands with a humanoid robot in Lanzhou. China now has more robots per 10,000 workers than Germany, but key breakthroughs in humanoid robot technology are years away © Chen Kun/VCG/Reuters

This year China plans to launch a new Rmb1tn ($137bn) state-backed venture capital fund aimed at channelling investment into humanoid robotics and other sectors prioritised by policymakers. In May, a coalition of ministries rolled out policies designed to mobilise bank lending and insurance capital into these strategic industries, part of Xi's push to build a self-reliant "strong science and technology nation".

Liang Liang, deputy director of the Beijing Economic-Technological Development Area, says the region is rolling out investment funds for robotics and other technologies. "Every region will have its own investment funds . . . to help accelerate development," he told the FT.

Audi's Liebeck says humanoid robots from a Chinese group tested at the Changchun plant featured promising technology, though their humanlike form could use changes. "We don't want [robots with] two arms, we want four or five arms," he says.

Given China's determination to double down on industrial policy, foreign countries face difficult choices after decades of emphasising services and consumerism, says Boullenois. She adds that some level of protection in sectors suffering from competition with Chinese exports that have benefited from subsidies and industrial policy would also be needed.

"The market distortions in China are so big that it prevents fair competition everywhere," she says. "You have to have higher trade barriers to protect your

everywhere," she says. "You have to have higher trade barriers to protect your nascent industries. That's what many developing countries do and I think in some sectors, like cleantech, we are also in that situation now."

Data visualisation by Ian Bott and Haohsiang Ko

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