



WHERE CHINA IS LEADING THE MOBILITY REVOLUTION

The nation once known more for technological imitation than innovation is now an international leader in electric vehicles and other next-generation mobility products

FOR YEARS, CHINA has been perceived as a nation that relied more on imitation and copycatting than on innovation for economic growth. It appeared to many that China was getting its best ideas working with companies based elsewhere, and there continue to be frequent accusations that its manufacturers do not respect intellectual property laws. While its high-volume, low-cost manufacturing prowess was never questioned, the line on China has been that it could not compete when it came to innovation.

Those days seem to be behind us. In the 21st century, China is emerging as a leader in many new technologies — especially those related to mobility. The Chinese government has pledged to convert the nation into an international innovation leader by 2030, but in many ways the nation has already reached that status, certainly when it comes to electric vehicles, batteries, drones, and high-speed rail.

Today, China is not only the biggest producer of electric vehicles (EVs) by far, it is also a leader in lithium-ion battery technology that powers EVs as well as smartphones and other mobile devices. Batteries are the power storage of the future as the world moves relentlessly toward the electrification of transportation, and while China controls 60 percent of the world's production of lithium-ion batteries and nearly half of the world's global lithium production, it is also hard at work trying to advance them and developing substitutes that could be cheaper and less combustible.

SILICON VALLEY EAST

On multiple fronts, Silicon Valley and other US tech hubs are evenly matched — or trailing behind — the imagination and technical prowess of Chinese companies. As one example, Chinese drone producers are well ahead of competitors in the development of autonomous systems for personal mobility, according to a 2018 World Economic Forum report. A Chinese-Austrian joint venture recently debuted a pilotless air taxi in Vienna that it said it would start producing in 2020.

China also announced its intention to build a national innovation center for high-speed rail in Qingdao and has been actively exploring trackless trams, a cross between a bus and a streetcar that runs on rubber tires. Autonomous versions of high-speed rail have also been in testing for the last two years.

According to a study by the Information Technology and Innovation Foundation, China has closed the gap between itself and the US in areas such as patents and top universities. In some areas like supercomputers, China is pushing ahead.

What has changed in China that made this transformation possible? Probably the biggest contribution to the country's technological surge was the strategic decision to invest heavily in research and development. Between 2000 and 2016, Chinese research and development investment grew on average 18 percent annually versus compound annual growth rates of 4 percent in the US and 5 percent in the European Union.

UNICORN COUNTRY

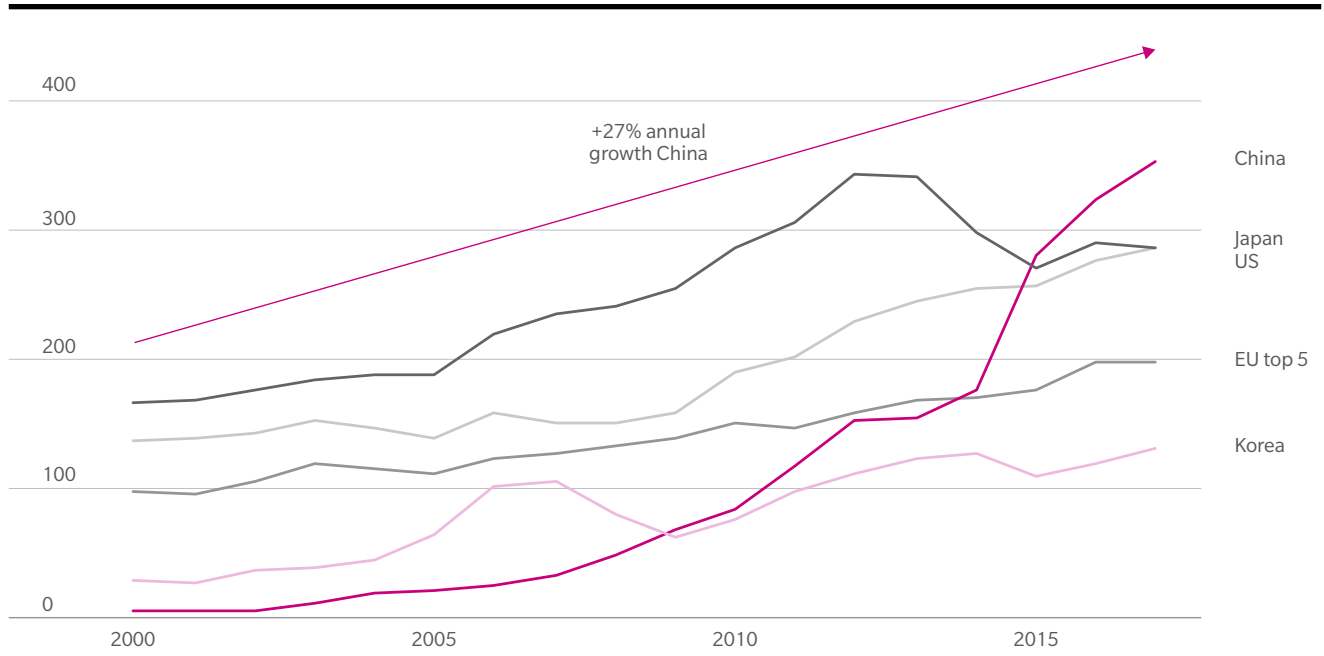
Thanks to this financial commitment to innovation, China has shown a dramatic increase in both its number of patent applications and patent grants. (See Exhibit 1.) Back in 2000, China's number of patent applications was less than one-tenth the number in the US. However, in 2017, China's applications equaled the sum of applications in the US, Japan, and the top five nations in the European Union. And since 2015, China has been the worldwide leader in patent grants, based on data from the World Intellectual Property Organization and an Oliver Wyman analysis.

Forty percent of global unicorns — startup companies with a valuation of more than \$1 billion — were based in China in 2018, according to TechCrunch. The 149 unicorns in China even beat out the 146 in the US, its closest rival.

A major enabler of the transformation from copycat to innovator has been provided by the five-year governmental plan "Made in China 2025." The program, which involves sizable government investment in major industrial sectors and the support of startups, is aimed at turning China into an international powerhouse in such industries as automotive, aerospace, and railcar production. The program wants to mirror the success China has seen in its solar panel industry — where it has become the No. 1 producer internationally — or in its civilian drone production — which in less than a decade has come to dominate the marketplace, thanks to Shenzhen-based drone leader Dajiang Innovation Technology Co. (DJI), which holds a 74 percent global market share.

EXHIBIT 1: CHINA HAS BEEN THE WORLD’S LEADER IN PATENT GRANT SINCE 2015

Back in 2000, China’s number of patent applications was less than one-tenth the number in the US.¹



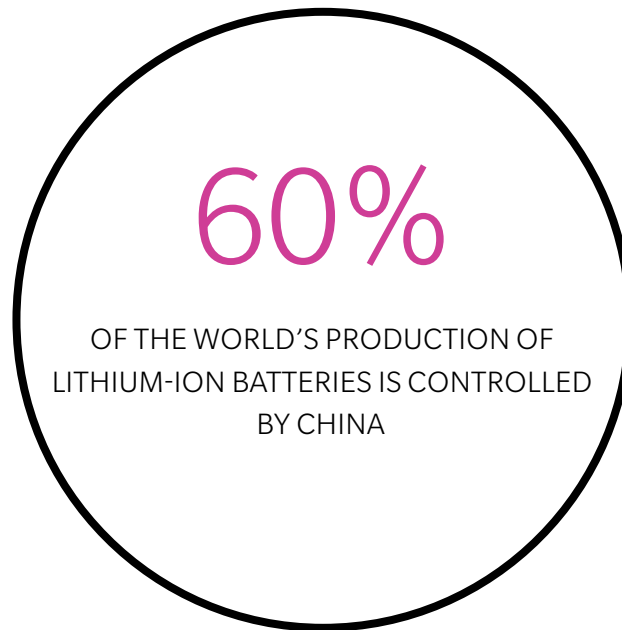
¹ Direct and PCT national phase entries by applicant’s origin (equivalent count)
Source: WIPO, Oliver Wyman analysis

EV FORWARD

So far, the most progress has been made in the automotive industry where Chinese government subsidies have helped build the largest market for electric vehicles in the world. By 2020, domestic manufacturers will have the capacity to produce 20 million EVs — an example of the enthusiasm with which entrepreneurs have greeted the challenge. The Chinese government was recently forced to stop the creation of new car manufacturing startups because of this overcapacity.

At this point, the nation has not yet started exporting EVs to the US or Europe. Even so, Chinese automakers may be better positioned than other nations to capitalize on expanding global sales. In July 2018, Bloomberg New Energy Finance (now BloombergNEF) reported that 4 million EVs had been sold. While it took 60 months to sell the first million EVs, it took less than a year to boost sales from 3 million to 4 million.

For certain, China has been helped by its massive population and one of the fastest-growing middle classes in the world. This provides companies a ready-made domestic market that can support innovation and sustain high levels of production without selling overseas. The sizable domestic market allows Chinese producers to become economically viable before taking on the world market.



ENTREPRENEURIAL POPULATION

China also boasts a population that is highly entrepreneurial and hungry for new technology. One of the reasons for the rapid growth in Chinese ride-hailing can be attributed to the number of Chinese who sought to supplement their income by driving.

Chinese consumers also show a willingness to try new technologies. In a 2018 survey on mobility conducted by Oliver Wyman, 33 percent of respondents from China said they were “very likely” to switch from public transport to autonomous vehicles when they became available; another 50 percent said they were “likely” to switch. That compares with only 13 percent of US respondents and 12 percent of German respondents who said they were “very likely” to switch.

For the US and Europe, the transformation of China into an innovation powerhouse means those countries, too, must increase their commitments to R&D and create favorable economic environments for collaborative innovation if they want to compete. This may mean speeding product development cycles or encouraging more joint ventures. But there is no doubt, especially when it comes to mobility, China is moving quickly.

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*This article first appeared in
MIT Sloan Management Review*