

COVER STORY

## The Industrial Dream

If COMAC's C919 jumbo jet takes off, so does China. But is the Chinese government's heavy hand weighing it down?

BY MICHAEL SCHUMAN — JANUARY 3, 2021



*Illustration by Sam Ward*

On a spring day four years ago, China's ultimate industrial dream came true. The C919, a single-aisle, two-engine jetliner, touched down in Shanghai to a throng of cheering spectators. No less than two members of the Communist Party's mighty Politburo attended the celebratory festivities. The C919 had just completed its 79-minute maiden voyage, and its safe descent marked a "centurial breakthrough," according to its manufacturer, the state-owned Commercial Aircraft Corporation of China (COMAC).

Shanghai Pudong International Airport, the company's statement gushed, "held its breath, stared soulfully, and opened its arms" as the C919, "with blue painting to symbolize the sky and green painting to symbolize the earth... lightly spread the wings of youth." COMAC went on to boast that it had already received orders for 570 C919s from 23 customers. Xinhua, the official state news agency, added to the excitement, proclaiming China had become "one of the world's top makers of jumbo aircraft."

From China's perspective, the euphoria was appropriate. The C919 represents everything China wants to be. It's big, powerful, high-tech, and capable of transporting the Chinese into the giddy heights of the global economy, where only a select handful of nations possess the knowledge and skill to survive in the thin air of elite competition. It's "Made in China," so it accelerates the country's quest for self-reliance, an especially prized virtue at the moment. No longer will the economy have to depend on untrustworthy, finger-wagging Americans and Europeans for a product critical to its progress. And most satisfying of all, the C919 confirms the superiority of China's system of government and business since it is a creation of the state — state policy, state money and a state company. That makes the C919 a victory for hearty "socialism with Chinese characteristics."

Even more, in this age of heightened superpower competition, the C919 is yet another stab at the dominance of the Western democracies. Meant to be China's answer to Boeing's 737

and Airbus's A320, the C919 won't merely replace those foreign intruders in the ever-expanding Chinese marketplace, but it can shove them off the world's runways, too. The prestige is priceless. A jetliner is "a very visible badge of having made it as an advanced technological nation," says [Arthur Kroeber](#), a founding partner of the research firm Gavekal.



Attendees in front of a Chinese C919 passenger jet after its maiden voyage in May 2017.

*Credit: Andy Wong/AFP via Getty Images*

Yet despite the fanfare, the C919 is still grounded. COMAC hasn't begun commercial production of the airliner, and Chinese regulators haven't certified it to fly ordinary passengers. COMAC also hasn't applied for approval from the U.S. Federal Aviation Administration, without which major international carriers won't even look at it. After 13 years of development, it remains unclear when a C919 will fly the friendly skies.

Rather than a soaring symbol of China's ascent, the C919 is an example of the challenges the country faces in reaching superpower status. It would be premature to write off the C919 as a white elephant, but its clumsy take off illustrates the dangers of simplistic assumptions about China's inevitable conquest of the global economy. More importantly, the airplane should raise doubts that the increasingly state-led direction of President Xi Jinping's economic policy can elevate China to new heights. Instead, Xi and his comrades may be prioritizing nationalistic swagger and autarkic fantasies that will fail to propel the further gains in income and welfare necessary to sustain China's rise on the world stage.

The tab for all of this uncertainty is steep. [Scott Kennedy](#), a senior advisor at the [Center for Strategic and International Studies](#) in Washington, figures the Chinese government and financial institutions have given COMAC at least [\\$49 billion](#) to fund its aircraft projects.

The C919 isn't fundamentally different from the Airbus models of the 1980s. Nor is the C919 as "Chinese" as it's heralded to be. The plane is about as "homemade" as an Ikea cabinet, pieced together with technology and parts from companies around the world — mostly from the West. Its engines are made by CFM International, a joint venture between General Electric and Safran Aircraft Engines, a French company, while Honeywell, Parker Hannifin, United Technologies, and a bevy of other well-known companies provided critical components and systems. According to a report released last year by CSIS, "almost every component in the C919 that keeps it aloft is a foreign import and not domestically designed."

For Beijing, none of these difficulties, delays or deficits matter. The C919 is a do-or-die project for China's economic future; if the C919 takes off, so does China. As COMAC's website proclaims, a homegrown jetliner "is an important part of the Chinese Dream" — Xi's vision of a rejuvenated China — and necessary "to become a real world power."

“They put in much more money than they expected, and it has taken a lot longer than they expected,” says Kennedy at CSIS. But, he adds, “the Chinese are not going to give this up.”



Kennedy takes viewers through the interruptions and challenges that COMAC's C919 has encountered.

### WHY CAN'T CHINA MAKE A PLANE?

The Chinese have been trying to get airborne for a long time. An initial attempt at a commercial jetliner began in the 1970s with the development of the Shanghai Y-10, a half-baked rerun of the old Boeing 707 that was scrapped while still a prototype. The origins of COMAC's current batch of models stretch back two decades. Yet today, only a handful of Chinese-made clunkers are puttering in the skies — none outside of China.

This sorry history begs the question: What's wrong? The answer is complicated, involving everything from the structure of the aviation industry to Chinese management practices. But China's long march to a homemade airliner exposes the limits and weaknesses of the country's state-led economic model. It's in vogue in certain political circles in the U.S. to marvel at China's economic success and endeavor to copy it, and inevitably, this leads to a fascination with Chinese industrial policy — those state-directed efforts to foster competitive industries with money and protection. The idea is that the very visible hand of the bureaucrat can produce economic results that the invisible hand of the market cannot, or at least not as quickly.

America's interest in Asian industrial policies dates back to the 1970s, when Japan, not China, was the rising power. Some experts believed Tokyo had devised a superior form of capitalism by infusing targeted state action into classical free-market economics, and if the U.S. didn't sprinkle some of this magic powder onto its own outdated, laissez-faire system, it would lose out in global competition. The ascent of China only reinforced the thinking that the inscrutable and meddlesome ways of the Asian technocrat had the upper hand in building the economies of the future.

But there is no consensus on whether industrial policy works. Proponents hold up case studies that make the link between state aid and industrial competitiveness. Critics contend such policies create more failures than successes. They certainly did not help Japan, which has not fully woken from its three decade-long slumber. In China, industrial policies have a record of spawning a lot of production, in sectors like solar panels or electric vehicles, but also lots of waste.

Still, there's something about China's airliner troubles that doesn't compute. You'd think that if any country could make a plane, it would be China. As the world's largest manufacturer, the Chinese have ample engineering talent, and they've already capitalized on it to develop high-speed rail and 5G telecom. They've even dispatched a rover to Mars and brought rocks back from the moon.

“ U.S. corporations and some European ones have basically, over many decades, built up these processes that enable them to manage these complicated integration projects. It’s intrinsically problematic for China just because it is a relative newcomer at a lot of these things. ”

— Arthur Kroeber, a founding partner of the research firm Gavekal

But making a commercial jetliner is, in certain respects, more difficult than sending a man into space. Hundreds of thousands of parts from a vast network of suppliers need to be painstakingly pieced together by an army of engineers with zero room for error. This gargantuan undertaking starts with a plane’s design and continues through to its manufacturing. All of these advanced components and systems have to be assembled in a repeatable process to deliver planes to customers. The slightest flaw could spell catastrophe. Even the most experienced firms in the industry can founder on the sheer complexity of their product — as Boeing’s woes with the 737 MAX exposed all too morbidly.

Eventually, with enough money and elbow grease, any hunk of metal can be made to fly. But that’s not sufficient. A commercial airplane has to be not only super-safe, but also uber-reliable and economically efficient. Any design defect that adds to an airline’s costs of operating IT makes a plane uncompetitive. “An aircraft that is a bit inefficient isn’t easy to sell,” says [Bradley Perrett](#), Asia-Pacific bureau chief for *Aviation Week*, “and an aircraft that is quite inefficient is impossible to sell.”

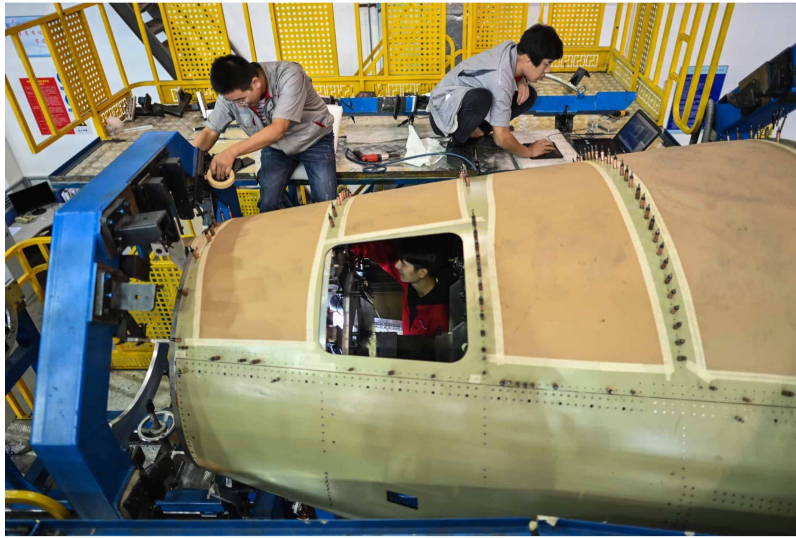
To be fair, China is not the only country to stumble down the runway. The difficulties Japan’s Mitsubishi has encountered with its regional SpaceJet proves that grappling with an airplane is tough for even the most technically advanced economies. But the C919 is being hamstrung by problems specific to China as well. Those start with the way Chinese companies work. Successfully producing a plane requires more than engineering skill. The answer can be found in the fuzzier realm of corporate organization and management. Gavekal’s Kroeber says Chinese industrial companies don’t have a great track record of merging heaps of parts and software into quality products, pointing to the country’s struggles to develop internationally competitive automobiles, a process similar to (but simpler than) producing an airplane. “U.S. corporations and some European ones have basically, over many decades, built up these processes that enable them to manage these complicated integration projects,” he says. “It’s intrinsically problematic for China just because it is a relative newcomer at a lot of these things.”

The secret is fostering an environment that encourages employees and middle-level managers to communicate and take initiative. Doing so is challenging in any large corporation; and in Chinese firms especially so, since decision-making is concentrated at the senior ranks. COMAC, by the very nature of its organization, is unlikely to be better than the norm. The Shanghai company was spun off in 2008 from the Aviation Industry Corp. of China (AVIC), a state-owned enterprise that manufactures fighter jets for the air force, and its culture is saturated by a command-and-control rigidity. Many COMAC managers have backgrounds in the defense industry, and its chairman, He Dongfeng, is a veteran of China’s state aviation sector. The result is a top-down mentality that inhibits that critical cross-company coordination. (COMAC did not respond to queries seeking comment.)

But the source of China’s airliner agonies may run deeper — into the purpose of the program itself. Simply producing a profitable aircraft company isn’t Beijing’s primary goal. The government’s officious planners want an entire Chinese aviation industry, with all the necessary know-how and supply networks under Chinese control. A 2014 [study](#) of China’s aviation policies by the Rand Corporation concluded that their ultimate objective is the “completely independent local development of a commercial aircraft without foreign



assistance.” COMAC, as the centerpiece of that plan, has strived to import key aviation technology, with the intention that China will eventually absorb them. As the [Rand report](#) says: “Chinese aviation industry leaders have made no secret of their desire to trade market access for technology; joint ventures are their vehicle of choice to acquire advanced foreign technologies.”



Employees work on the COMAC C919.

*Credit: Hector Retamal/AFP via Getty Images*

[Richard Aboulafia](#), vice president at the market research firm Teal Group, argues this part of the plan has dangerously compromised China’s aircraft ambitions. While Brazil’s Embraer, the only successful new entrant in modern times, produces its planes by tapping the best suppliers from around the world, COMAC has followed a different strategy, preferring foreign companies that were willing to partner with Chinese firms. Aboulafia calls this the “secret sauce of the poisonous jetliner recipe.” Not only has this approach restricted the number of suppliers that might work with COMAC, Aboulafia suspects some of those that did were wary of sharing their best stuff with Chinese partners intent on becoming competitors. “You may not go shopping. You must source from whoever is willing to come here and effectively bend the knee,” he says. “It is a crap model for developing an aircraft and it’s not going to work.”

#### WHY CAN’T CHINA SELL A PLANE?

Convincing the world’s carriers to buy the C919 won’t be much easier than making it fly. So far, COMAC has had a hard time finding willing customers. The company already has another, earlier model up for sale, the ARJ21. Smaller than the C919, the jet is meant to carry fewer than 100 passengers on regional jaunts. The first ARJ21 was delivered to an airline in 2015. Five years later, only 37 are in service, according to data from *Aviation Week*, and none outside of China. Even China’s airlines haven’t rushed to stock them. Most of the ARJ21s are flown by carriers you’ve probably never heard of before — such as Genghis Khan Airlines. Nearly half are in operation with Chengdu Airlines, a second-string carrier that just so happens to boast COMAC as its largest shareholder. The order book is no more impressive. The only customers of note outside of China is the aircraft-leasing arm of GE — a COMAC supplier.



Most of COMAC's ARJ21s that are still operational fly under Chengdu Airlines, whose largest stakeholder is COMAC.  
Credit: Xu Zheng, [Creative Commons](#)

The ARJ21 can't find customers, analysts say, because it doesn't deserve them. In development since 2002 — and inherited by COMAC after its founding — the model's engines are already being phased out by the rest of the industry and a poor design has made it heavier and more costly to operate than its competitors. Teal's Aboulafia calls it “a pile of junk.”

The C919 may face similar turbulence. The plane lacks clear advantages over Boeings and Airbuses, and CSIS's Kennedy believes COMAC is overstating the orders it has for C919s, estimating in a December report that a mere 148 of the claimed 1,065 may be fully confirmed. Industry leaders aren't exactly quaking in their cockpits at the thought of competing with COMAC. As Christian Scherer, Airbus's chief commercial officer, said in 2019: “The products that are being offered by the new entrants really don't bring anything new to the market.”

Of course, Beijing could try to use the muscle of the Chinese state to force itself into the global marketplace. It's managed this feat before, most notably with Huawei. The telecom giant would team up with Chinese banks to offer financing packages on its networks that were often too good to pass up, especially for cash-strapped low-income nations. COMAC could trot out the same tactics to entice international airlines to buy C919s instead of 737s.

But cheap planes are different from cheap telecom systems, and not just because people, not data, travel on them. In the end, airlines prefer jetliners they know will make them money. “Fundamentally, what it will come down to is whether that airplane can be utilized effectively by the airline,” says [Bradley Dailey](#), a Hong Kong-based director at [Alton Aviation Consultancy](#). “Frankly, they are probably not going to sell a tremendous amount of airplanes outside of China.”

“ “ If the Chinese government forces the Chinese airlines to take deliveries from COMAC then the reality is that they can distort the global market. ” ”

— Chad Ohlandt, senior engineer at Rand

For a purely commercial endeavor, especially one requiring such massive investment, failing in the global market would spell disaster. But COMAC is nothing of the sort. As a state-backed program, earning a profit may be something of an extra, like that unexpected upgrade to first class — a wonderful perk, but not necessary to get you where you want to go. And that may be even more true in Xi Jinping's China. As relations with the U.S. deteriorate, Xi has placed increasing emphasis on “self-sufficiency” — limiting the country's vulnerability to outside forces. Airplanes are one of China's most critical imports, so even if foreigners don't buy C919s, Xi could create a market for them at home. Since many airlines in China are state-owned, Beijing could compel them to substitute COMACs for foreign imports — which may already be happening. It is an unlikely coincidence that all three of China's major state carriers — Air China, China Southern and China Eastern — each inked orders for 35 ARJ21s *on the same day* in August 2019. And as a sign of what may be coming, Boeing, as far as analysts can tell, has been denied new orders from Chinese airlines for the past four years, likely in retaliation for the Trump administration's trade war.

Teal's Aboulafia says Beijing's primary goal may not be to compete in the world aviation market, but to wall off China's domestic market and fly Chinese-made planes as much as possible, à la the old Soviet Union, which crafted a homemade (and inferior) replacement to each major Western model. COMAC is already working with Russia's United Aircraft Corp to develop a wide-body airliner, the CR929, which is meant to compete with the Boeing 787. Aboulafia says China's strategy only makes sense “if you don't care about the aircraft, you just care about decoupling and preparing for a future that is decoupled.”

Yet COMAC's influence could still float around the world even if its planes don't since China is the world's largest market for airplanes. Boeing recently [forecast](#) that China will buy 20 percent of all commercial aircraft over the next two decades. “If the Chinese government forces the Chinese airlines to take deliveries from COMAC then the reality is that they can distort the global market,” says [Chad Ohlandt](#), senior engineer at Rand.

That makes China's quest for aviation greatness of great consequence for the global economy, whatever may come of the C919. Since COMAC will likely continue learning and absorbing know-how, the question is not just what COMAC can do now, but what it may be able to do in the future. [Sheila Kahyaoglu](#), an aerospace analyst at Jefferies, doesn't consider the C919 a serious threat to Boeing, because it “has a big technology disadvantage,” but she also doesn't completely dismiss COMAC. “We would look to the next decade or the next product cycle, maybe 10 or 15 years from now, where COMAC could put in a more formidable competitor,” she says.

Indeed, while the saga of the C919 seems to indicate that the Chinese state can only take the economy so far, COMAC will likely have access to unlimited funds no matter how long its managers take to get planes airborne. “Ultimately, their goal is to displace Boeing or Airbus,” says Rand's Ohlandt. “The Chinese play the long game. The theory is that, say, by 2049, they would have a shot.”



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## Pole Position

BY EYCK FREYMAN

In public, Chinese diplomats and climate negotiators deny that they see any link between climate change and geopolitics. But there is a deeply cynical consensus within China's academic and policy communities that climate change creates geopolitical opportunities that China can exploit — and must exploit before its rivals do. Greenland was the proof of concept for this strategy. And it caught the U.S. flat-footed.

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