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Staff members collect experimental data at an AI robotics lab in Zhangjiang Science City, formerly known as Zhangjiang Hi-tech Park, in Shanghai's Pudong New Area on March 26, 2025. PROVIDED TO CHINA DAILY

AI-enabled pharmaceutical R&D market growing quickly

Chinese players making waves on global stage in promising sector

By LI JING
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A worker makes traditional Chinese medicine products at an intelligent pill workshop in Zhangshu, Jiangxi province, on July 8. WAN XIANG / XINHUA

Artificial intelligence has drawn billions of dollars in global investment as pharmaceutical giants race to accelerate new drug development, yet the AI drug discovery sector is still defining its viable commercial models. In China's vibrant biotech ecosystem, two industry heavyweights with deep roots in the country are now offering different answers.

Recent financial results from XtalPi Holdings Ltd and InSilico Medicine Cayman TopCo show the sector diverging into two distinct business models — one built on selling AI-powered research services, the other on using algorithms to create entirely new biotech pipelines.

The difference is already visible in their financial performance, as the two companies navigate the capital markets, with XtalPi being among the first specialized tech firms to list under Hong Kong's new Chapter 18C rules and InSilico delivering Hong Kong's largest biotech listing of 2025 by funds raised.

XtalPi reported revenue of 802.6 million yuan ($111 million) in 2025, representing a 201.2 percent year-on-year increase, and posted its first full-year net profit of 134.6 million yuan, with adjusted net profit reaching 258.2 million yuan. The figure makes it the first profitable AI for Science company listed on the Hong Kong H-share market.

InSilico, by contrast, generated $56.2 million in revenue, but reported an adjusted net loss of $43.8 million, which the company said "was primarily attributable to the decline in revenue and partially offset by the decrease in research and development expenses".

The contrast highlights a broader debate across the global artificial intelligence drug discovery sector: whether AI should be commercialized primarily as a research platform or as the foundation for building biotech companies.

XtalPi has positioned itself as a technology platform for pharmaceutical companies. Its core business combines AI-driven molecular simulation with automated laboratories and robotics systems designed to accelerate early-stage drug discovery.

Rather than relying on developing drugs itself, the company primarily generates revenue from research services and experimental infrastructure provided to global pharmaceutical groups, adopting an approach that resembles an AI-enhanced contract research organization.

Analysts at JPMorgan wrote in a recent report that XtalPi's model essentially provides the infrastructure for AI-driven drug discovery. Because revenue is tied to research contracts rather than drug approvals, the model offers relatively predictable income.

The company's drug discovery solutions segment generated 537.9 million yuan in revenue last year, up more than fourfold year-on-year, while AI4S intelligent solutions contributed another 264.7 million yuan, it said.

Industry experts said XtalPi's service model effectively shifts the high risk of drug development — where more than 90 percent of candidates fail in clinical trials — back to pharmaceutical clients. The company bears mainly technology delivery risks rather than clinical risks.

According to a 2025 report in South China Morning Post, Zhang Peiyu, the chief scientific officer at XtalPi, stated that the company's AI+robotics platform has raised the success rate of chemical synthesis experiments from 20-30 percent to around 90 percent and would reduce drug discovery timelines to about one or two years rather than the four years it often takes now. Such service-oriented models deliver relatively stable cash flow, helping support continuous platform iteration.

InSilico Medicine has chosen a more ambitious — and riskier — route. The company uses its Pharma.AI platform — its proprietary end-to-end generative AI platform — to design drug candidates and advance them through clinical development, effectively operating as an AI-driven biotechnology company.

That approach requires far larger research spending. InSilico invested about $81.4 million in R&D in 2025, equivalent to roughly 145 percent of its annual revenue.

The company has produced 28 preclinical candidate compounds since 2021, more than 10 of which have received investigational new drug approvals and entered the clinical stage.

The strategy recently delivered a high-profile validation. InSilico signed a collaboration agreement with Eli Lilly and Company, granting the US drugmaker exclusive global rights to develop, manufacture and commercialize potentially best-in-class novel oral therapeutics currently in preclinical development for certain indications, while the two sides will also collaborate on multiple R&D programs focused on targets selected by Lilly, the company said.

The deal includes an upfront payment of $115 million and could reach $2.75 billion if development milestones are achieved.

For companies pursuing the biotech model, such partnerships are the primary route to revenue. But income often arrives in large and irregular payments tied to licensing deals and clinical progress, producing volatile financial results. These milestone payments serve as a crucial lifeline to extend their cash runway and fund the heavy cash-burn required for ongoing clinical trials.

The split between platform and biotech strategies is not unique to China. Across the industry, AI drug discovery companies are experimenting with different ways to commercialize their technology.

US-based Recursion Pharmaceuticals has adopted hybrid strategies combining platform partnerships with internal drug pipelines, while major pharmaceutical companies — including Pfizer, Sanofi and Lilly — have signed dozens of AI discovery partnerships in recent years.

The hope is that machine learning can reduce the time and cost required to identify promising drug candidates.

Despite rapid advances in AI, many researchers and industry insiders say the technology is unlikely to transform drug development as dramatically as some investors expect.

Ding Sheng, director of the Global Health Drug Discovery Institute, said the core challenge lies in biology rather than computing power.

"Compared with fields like natural language processing, the datasets available for drug discovery are much smaller," Ding said. "Our understanding of biological mechanisms is still incomplete."

While AI can accelerate early-stage discovery, he said candidate drugs still face years of clinical trials before reaching approval.

Ren Feng, co-CEO and chief scientific officer of InSilico Medicine, offered a similar industry perspective from a drug developer.

"AI excels at compressing timelines in preclinical research, but once a candidate enters the clinic, its role diminishes sharply. Clinical development remains a years-long, highly regulated process that AI cannot bypass. The real limits are our incomplete biological knowledge and the scarcity of high-quality training data — not computing power," Ren said.

China has emerged as one of the most active centers of AI drug discovery in recent years. Industry analysts say the country's strong pharmaceutical manufacturing base, large patient population and rapidly expanding AI talent pool have helped accelerate development.

Ding said the global industry remains at an early stage, with technological capabilities across companies still relatively close.

"In many areas, Chinese companies are now running alongside foreign peers," he said. "In some directions, they may even move ahead."

China's policy support is increasingly aligning with the rapid rise of AI in pharmaceutical R&D, with the authorities placing AI-driven drug discovery high on the national innovation agenda.

In April last year, the Ministry of Industry and Information Technology and six other government departments jointly released an Implementation Plan for the Digital-Intelligent Transformation of the Pharmaceutical Industry (2025-30). The policy blueprint calls for the establishment of more than 10 national pharmaceutical AI model innovation platforms and encourages the expanded use of AI across key stages of drug development.

According to market consultancy Frost & Sullivan, the global AI-enabled pharmaceutical R&D market is projected to grow from $11.9 billion in 2023 to $74.6 billion by 2032, representing a compound annual growth rate of 22.6 percent, underscoring a strong trajectory of growth and certainty for the sector.

Innovation injects drive into pharma industry

By LI JING

After years of pouring billions into research and development, China's pharmaceutical sector is finally reaping the rewards. As the 2025 annual reporting season unfolds — from traditional pharmaceutical giants to emerging biotech firms and artificial intelligence-driven research players — companies are proving they can successfully translate heavy R&D investment into sustainable earnings.

The financial rebound is more than just a market correction. It is a validation of the sector's growing role in driving new quality productive forces. In the 2026 Government Work Report, biomedicine was identified for the first time as an emerging pillar industry, alongside integrated circuits, aviation and aerospace, and the low-altitude economy.

The numbers tell a story of an industry turning a corner. According to financial data provider Wind Info, among the 169 pharmaceutical and biotech companies that had disclosed their 2025 annual reports by late March, 121, or more than 70 percent, posted profits, with 20 of them seeing net profit more than double.

Analysts say this financial turnaround is a result of a maturing ecosystem, where supportive policies, accelerating commercialization of homegrown innovative products and booming cross-border out-licensing deals are aligning.

In 2025, the State Council and health authorities introduced a series of measures from expedited regulatory approvals to improved reimbursement mechanisms, aimed at fostering high-quality development of the pharmaceutical sector throughout the innovation chain.

On top of that, the most striking driver of this newfound profitability is the global appetite for Chinese innovation. Cross-border out-licensing deals, where Chinese drugmakers often sell the rights to develop and market their discoveries globally, have exploded.

According to industry database provider PharmCube, Chinese drugmakers signed more than 150 out-licensing agreements in 2025, with total deal value more than doubling from the previous year.

One of the largest transactions in 2025 was a staggering $11.4 billion global collaboration between Innovent Biologics and Japan's Takeda Pharmaceutical, setting a new record for the industry.

Industry insiders say the nature of such deals is also evolving.

"Early collaborations were mainly simple license-out deals where Chinese companies handed over drug candidates and multinational partners took over global development," Qian Lei, chief research and development officer of general biomedicine at Innovent Biologics, told Economic Information Daily. "Now, partnerships increasingly involve joint development and commercialization. It reflects a true global recognition of Chinese R&D capabilities."

The shift underscores the rapid growth of China's innovative drug industry.

The global validation is backed by domestic productivity and innovation. Regulators in China approved a record 76 innovative medicines in 2025, up from 48 in the previous year.

"China now ranks among the global leaders in both innovative drug pipelines and clinical research activity. We are moving from expansion in scale to improvement in quality," Qian added.

The momentum shows no signs of slowing. Preliminary data from the National Medical Products Administration showed that China's out-licensing deals for innovative drugs topped $60 billion in the first three months of 2026, nearly half of the value recorded for 2025.

This "harvest season" is being led by companies that dared to reinvent themselves.

Industry bellwether Jiangsu Hengrui Pharmaceuticals exemplifies this successful transition. The company reported a 2025 revenue of 31.63 billion yuan ($4.64 billion), up 13 percent from a year earlier, while net profit rose nearly 22 percent to 7.71 billion yuan.

Crucially, sales of innovative medicines reached 16.34 billion yuan, accounting for more than 58 percent of its pharmaceutical revenue. Out-licensing income also increased 25.6 percent as milestone payments from collaborations with multinational companies including Merck and GSK were recognized.

By investing a massive 8.72 billion yuan in R&D last year, equivalent to nearly 28 percent of its revenue, the company has set the stage to grow its innovative drug sales by more than 30 percent in 2026.

Another major player, Innovent Biologics, is also coming of age, reporting its first full-year profit since its founding. Driven by a dual strategy targeting both oncology and chronic diseases, its product revenue surpassed the 10-billion-yuan mark for the first time, helping to achieve net profit of 814 million yuan.

By the end of 2025, the company had 13 approved oncology drugs targeting major cancers including lung, liver, gastric and colorectal cancers. Its PD-1 inhibitor Sintilimab remains one of China's leading domestically developed immunotherapy drugs and continues to generate stable cash flow.

At the same time, Innovent has expanded into metabolic and autoimmune diseases, areas that Qian said represent a second growth engine.

Smaller biotech companies are also beginning to emerge from the shadows of long-term losses. InnoCare Pharma reported its first annual profit in 2025, reversing a 441 million yuan loss to a 644 million yuan net gain.

Jasmine Cui, co-founder and CEO of InnoCare, called the milestone a "turning point" as the company's core product — the BTK inhibitor Orelabrutinib — saw sales climb 41 percent, following broader medical insurance coverage.

Meanwhile, the integration of "AI Plus" into healthcare is moving from concept to tangible commercial value. XtalPi Holdings Ltd, a pioneer in AI-driven drug discovery, posted its first annual profit in 2025, as its technology helps drugmakers drastically cut development times.

Despite the celebratory mood, insiders and analysts caution against blind optimism.

Some companies are still pursuing crowded drug targets and duplicating research, a dangerous game that risks wasting resources and intensifying competition, Qian said.

Brokerage analysts say the industry is entering a more selective phase in which companies with strong pipelines, differentiated technologies and global commercialization capabilities are likely to outperform.

"The industry is moving toward a K-shaped recovery," analysts at China International Capital Corp said in a recent note. The days of "high investment, low profitability" are ending, but only for the fittest.

"Companies with strong core products and established infrastructure for global commercialization are poised to lead the next phase of industry growth."

Researchers develop new drugs at a lab of Innovent Biologics in Suzhou, Jiangsu province, on Jan 10, 2022. YANG HAISHI / FOR CHINA DAILY