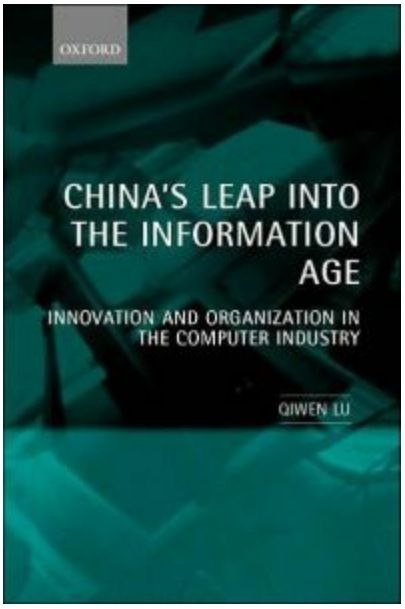

Book China's Leap into the Information Age

Innovation and Organization in the Computer Industry

Qiwen Lu
Oxford UP, 2000

Recommendation

Chinese tech firm is an oxymoron, right? Not at all, according to this intriguing work by the late professor Qiwen Lu. This book, fascinating at times, offers an in-depth look at four successful Chinese tech enterprises. Taking each of the four as a case study, Lu thoroughly illustrates the challenges facing a bureaucracy attempting to break into a fast-changing industry. In spite of its good points, Lu's book isn't perfect. The text is laden with jargon, and at times it's difficult to understand exactly how these enterprises are organized. Still, there's plenty to like about this book. *BooksInShort* recommends it to anyone interested in emerging economies, technology or international trade, or to anyone willing to have their expectations overturned.

Take-Aways

- China's technology industry, which did not exist in the early 1980s, now dominates its domestic market.
- Chinese tech firms have won market share on price and performance.
- China's science and technology system provides invaluable infrastructure to young firms.
- The leading tech firms in China exist outside the state budget process.
- Four tech firms - Stone, Founder, Legend and Great Wall - are examples of successful, innovative Chinese enterprises.
- These firms are publicly traded but ultimately controlled by the Chinese government.
- All four started slowly, struggling to find their way in a competitive marketplace.
- Each of these four firms ultimately found a profitable niche.
- These four enterprises had access to the communist regime's rich science and technology resources, a state subsidy that was key to their success.
- The mission of these enterprises was to transform the state's technological resources into profitable products.

Summary

In the 1980s, Chinese manufacturers weren't players in the personal-computer market. Even in the early 1990s, Compaq and IBM controlled the PC market in China. However, by the late 1990s, Chinese computer makers had taken control of two-thirds of the Chinese computer market. What changed?

Chinese companies such as Legend Group, Beijing Founder Electronics and China Great Wall Computer Group learned how to make PCs that were just as fast and often cheaper than those made by American companies. Chinese companies distinguished themselves in both performance and price in the computer industry, which is among China's most open and competitive markets. China became a net exporter of computer equipment in 1991.

Building Capability from the Top Down

Astute observers could have predicted this rise of homegrown Chinese PC firms. Their success is the result of a long process of capability building or technological learning, which began in the early 1980s, when the Chinese government reformed its science and technology system. In a developing nation such as China, technological concerns must obtain skills through a learning process, which is defined as acquiring the ability to develop technology and make a profit with it.

> "(The) Chinese Great Wall Computer was a success story in the transformation of the Chinese state-owned computer industry. It demonstrated that all-out privatization was not a necessary condition for a successful transformation of state-owned industries."

Many developing countries build technology industries with a "bottom-up" process. They start with the assembly of products, a function that draws upon cheap labor. Then, the nation progresses to manufacturing original equipment, to creating original designs to manufacture and, finally, to original brand manufacturing. However, China followed a "top-down" process, thanks to a central planning structure that focused resources on building a computer industry.

> "What Legend had done was to create an organizational framework that was capable of effectively turning technological resources into market success."

China's centrally planned economy followed the Soviet model, and it worked because China's infrastructure had enough resources to tackle large projects. For instance, China developed satellites and both atomic and hydrogen bombs. State budgets provided all the necessary workers, materials and money for those projects. In this way, China's nuclear weapon development was similar to the United States' Manhattan Project. Still, China's research and development infrastructure wasn't as effective as a capitalist model. The biggest problem was that managers had no motivation to innovate.

Four Companies Born of Reform

In the 1980s, China reformed its science and technology system, acknowledging the importance of science and technology in economic development. The government created a new type of firm known as the Science and Technology (S&T) Enterprise, or keji qiye. The four leading technology companies in China - Stone, Legend, Founder and China Great Wall Computer - are S&T enterprises that share several key characteristics:

- They are non-governmental - They exist outside central or local budget channels.
- They are young and fast-growing - All four were founded in the mid-1980s. While small compared to multinationals, they're among China's 500 largest companies.
- They are competitive niche leaders - Legend is a PC and motherboard maker; Founder makes electronic publishing systems; Great Wall supplies PC components and peripherals and Stone dominates China's word-processing market.
- They were among the first Chinese enterprises to go public on stock exchanges - Still, all four are controlled by holding companies that are controlled by the government.

Case Study: Stone

Stone is the largest non-governmental enterprise in China, and it was the first company to sell an integrated Chinese word processor. Graduates of China's top engineering school, Qinghua University, launched Stone in 1984. Liu Haipin, Wan Runnan and Shen Guojun

wanted to start a company that would fill the gap between China's science and technology infrastructure and the needs of the Chinese economy. The risks were obvious. None of the founders had entrepreneurial experience, and launching a non-governmental tech firm meant venturing into uncharted territory. But they were also alert to the opportunities involved. China had been flooded with personal computers in the early 1980s, but most of the PCs gathered dust, because there was little Chinese-language software, and only one expensive, Toshiba printer was capable of producing Chinese-language characters.

> "The rise of these indigenous Chinese computer enterprises was neither sudden nor surprising. It was the result of a long-term process of capability building or technological learning, which could be traced back to government initiatives in reforming the nation's science and technology system in the early 1980s."

Stone's first success came when it was able to add Chinese-language capability to a Japanese printer. Because Stone's printer was smaller, lighter and cheaper than Toshiba's model, Stone's printer drove Toshiba's product out of the Chinese market. The printer was a financial success. Stone's next success came with a Chinese-language word processor, which became a cash cow for the company. From 1984 to 1988, Stone introduced a new product every year - and sales jumped 300% a year. As a result, Stone turned into one of China's most-recognizable enterprises, and its founders became economic heroes. When most Chinese enterprises were merely taking orders from state bureaucrats, Stone was autonomous. Stone's success came at a time when China was searching for models of economic reform.

> "The mission of these enterprises was to turn the state's accumulated - but commercially underdeveloped - technological resources into competitive industrial products."

So who really owned this phenomenal company? Good question. Stone was created as a rural township enterprise, under the jurisdiction of Evergreen Township. The township provided seed money, and Stone's directors included township officials. Stone was to give 60% of its profits to the township. Stone later reorganized into a general holding company, then to a group company, which provided a structure that accommodated its subsidiaries.

> "The nation as a whole was earnestly seeking new organizational breakthroughs in the process of economic reform, and this company's experience was invaluable. Stone soon became one of the most high-profile enterprises in China."

While the media in capitalist nations often refers to Stone as a private enterprise, the company was actually formed as a collective. Employees owned the collective, but when an employee left, he couldn't take shares with him. The company accepted this Catch 22 in part because Stone clearly benefited from the state's infrastructure. The engineers who developed Stone's products were educated in state universities and gained experience in state work units. But while state-run bureaucracies could not develop and market products profitably, Stone combined the state's technological resources with its own marketing.

> "An often-overlooked fact in dealing with the issue of transition from centrally planned economies to market-oriented ones is that many former centrally planned economies are late developers."

Stone's employees were rewarded. As the company evolved, it began to pay salaries twice as large as those offered by state-run institutions. Its ownership structure continued to change. In 1986, Stone reorganized from a collective to a joint-stock company, offering a tiny stake in the company as stock. As a Stone executive points out, collective ownership meant, "owned by no one." The company hoped to create an incentive for employees to be productive. In the initial stock offering, the amount of capital raised amounted to only one percent of Stone's assets. In 1993, Stone went public in the more traditional capitalist sense, with an offering on the Hong Kong Stock Exchange. Direct placements and the IPO raised HK$300 million. Flush with capital, Stone continued to grow. While its competition has intensified, the company has played a key role in China's sweeping economic changes.

Case Study: Legend

Legend, which sold five million computer motherboards and add-on cards in 1995, is China's largest information technology company. Legend is also the third-largest seller of PCs in China, after AST and Compaq. Eleven research fellows from the Institute of Computing Technology founded Legend in 1984. They struggled at first, even selling roller skates. When Legend began to focus on developing software and hardware, its ties to the state institute proved invaluable. Legend is state-owned, but not state-run, making it an example of the new type of enterprise that emerged after China reformed its science and technology system.

> "Innovation is the soul of high-tech enterprises."

In its early days, Legend developed word-processing software, but its leadership soon decided to develop, make and sell computer systems instead. To achieve this goal, Legend needed to accomplish four things:

1. Form a trading company in Hong Kong - Legend wanted to set up a foreign trading company to build capital and tackle new market niches. Because the company knew little about the world market, it missed market opportunities. For instance, Legend created an add-on card that connected PCs and faxes. Demand was tiny in China, and by the time Legend realized there was a large world market for such a product, the opportunity already had vanished. Legend teamed up with Daw, a small Hong Kong computer trading company, in a joint venture to import computers and sell them in Hong Kong and China.
2. Form an industrial company abroad - Legend bought a small Hong Kong plant, Quantum Design Inc., in hopes of breaking into the world motherboard market. However, production snafus and a malfunctioning motherboard that had to be recalled crippled the company's early efforts. Legend weathered those crises and won a spot in the PC motherboard market. The moral: The world market was more cutthroat than the Chinese market.
3. Integrate research, development, manufacturing and marketing - A less-than-rigorous testing process proved to be partly to blame for the faulty motherboards. Legend learned that it needed independent testing of its products, and set up R&D labs in Silicon Valley, Hong Kong and China. Based on its expertise in the motherboard and add-on markets, Legend began designing computers. China started to become a large supplier of low-tech accessories such as computer cases, monitors, power units and keyboards, which gave Legend a cost advantage, since it no longer needed to import such peripherals. As a result, Legend could sell computers for as much as 20% less than Compaq and AST, but still net a 6% profit.
4. Go public on the Hong Kong Stock Exchange - To prepare for its listing, Legend reorganized, creating a new holding company that took over the old Legend. When Legend went public, it raised HK $220 million. Legend provided a model, turning the Institute of Computing Technology's expertise into profitable products.

From Bureaucracy to Innovation

Like Stone and Legend, Founder based its success on technology rather than on cheap labor. Founder, which makes electronic publishing systems, had to overcome its roots as a bureaucratic organization. It successfully reorganized to emphasize innovation, and eventually went public on the Hong Kong Stock Exchange.

> "Realizing that the traditional way of organizing was insufficient for an industry undergoing rapid technological change, the technocrats at the Computer Bureau started exploring new organizational forms."

The China Great Wall Computer Company likewise was forced to transform itself from a sluggish state-run enterprise into a more nimble organization. The company was an early 1980s spin-off from the Chinese Computer Bureau and the technocrats who ran it realized that competing required a new type of organization. Using the Chinese Computer Bureau's expertise, the company reorganized to make and sell a PC designed to meet Chinese word-processing needs. In the process, it made itself more like Western companies and less like a communist state-run firm. It came to dominate the Chinese PC market and signed a joint venture with IBM. The company showed that a state-owned firm didn't need to be privatized to compete in the high-tech marketplace.

> "The ease of access of these enterprises to the rich science and technology resources in the state sector was indispensable to their rapid success in commercializing the technology."

All four firms - Stone, Legend, Founder and Great Wall - followed similar paths to success. They started with innovative designs of new products or redesigns of existing products. All four lacked entrepreneurial cultures or manufacturing capabilities, but they overcame these obstacles, building capital and constantly improving their technology and production.

About the Author

The late **Qiwen Lu** was assistant professor of Asian business at the European Institute of Business Information in Fontainebleau, France. He died of liver cancer in August 1999, shortly after finishing this book.