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CONSUMER CHAMPION

BACKWARDNESS has its advantages. The latecomer to industrialisation can learn from the example of countries that went before it. China, unsurprisingly, gleans what it can from the models to its east: Japan and South Korea. On occasion, its policymakers have revealed a longing for their own national champions, imperious industrial conglomerates akin to the keiretsu of Japan and the chaebol of South Korea. In 1998 Wu Bangguo, a deputy prime minister, argued that China's international economic standing “will be to a large extent determined by the position of our nation's large industrial groups”.

But China's industrial evolution has defied these aspirations. The obvious candidates as national champions were the big state-owned enterprises. But most of China's manufacturing progress has taken place around and between these moribund hulks, not through them. China's industrial economy teems with small, independent enterprises, not big, integrated flagships. Only four of China's ICT companies (three of whose headquarters are in Hong Kong) rank in the world's top 250 as measured by 2005 revenues.

This poses an insuperable problem for any Chinese policymaker hoping to emulate the industrial stewardship of Japan's or South Korea's ministries. In South Korea in the 1970s, Dwight Perkins of Harvard University has pointed out, fewer than 200 firms accounted for more than half of the country's manufacturing. By coaxing and cajoling these firms, the state could hope to steer the nation's economy. In China, the

state would have to marshal hundreds of thousands of firms. China's manufacturing economy has no commanding heights. Its future will be decided elsewhere.

Waifs and strays

In every cranny of the SEG electronics market in Shenzhen, customers can find the electronic equivalent of a butcher's shop, displaying the guts of a computer, raw and glistening. Capacitors, circuit boards, switches, nuts, bolts and other offal are laid out on countertops. Spilling over the sides is every variety of cable, as tangled as the noodles the shopkeepers wolf down at lunchtime. The market lives on the first nine storeys of a gleaming octagonal tower, one of Shenzhen's many self-conscious monuments to modernity. But those who cannot afford a counter in the tower open shop on the pavement outside. There, a man sells a circuit board from a cardboard box, balanced on the saddle of his one-speed bike.

As the journalist James Fallows has noted, the market showcases the peculiar character of Chinese manufacturing. Many of the industries China now occupies have become increasingly “modular”. The bits and bobs on offer (displays, cables, cards, chips) do not belong to one product or another. They can plug into any number of gizmos, some of which may not yet exist. The resulting combination hangs together because any bit can fit with a bob: the rules governing how they mesh become industry-wide standards.

Some believe this modularity sharply distinguishes Chinese manufacturing from that of its Japanese and South Korean forerunners—though they disagree about whether China's climb up the technological ladder will be harder or easier as a result. In Japan and South Korea, the leading companies took an intimate interest in every stage of a product's birth: conceiving it, procuring the materials, fashioning the parts, assembling them and marketing the result. This chain of production was contained within a family of firms, led by a national champion.

These corporate families prospered by tuning and improving things, up and down the chain of production. The lead firms would pass on know-how to, and demand higher standards from, their contractors and sub-contractors. For Toyota, the factory floor was the laboratory.

Some fear that China's small, modular manufacturers cannot evolve in this way. Since the parts they provide can be of use in many products, no lead firm has reason to nurture them or help them improve. Chinese firms are not part of a corporate family. But without close collaboration with more advanced sponsors, how will these young waifs and strays learn?

One example is motorbikes. Honda wants its suppliers to get better, because their parts fit only Honda's bikes. Chinese bikemakers, on the other hand, use interchangeable parts that might also be used by dozens of rivals. Similarly, if Motorola were to help BYD, a Chinese company, make better lithium ion batteries, Motorola's competitors would benefit as well.

But Motorola (as Wei Xie of Tsinghua University and Steven White of INSEAD point out) did help BYD make better batteries, sending engineers to its site to show them how. (And sure enough, the battery-maker does now supply Motorola's

rivals.) Other evidence points in the same direction. The country may not have a Toyota or a Hyundai of its own, but its car-parts industry has nonetheless picked up a few things under foreign tutelage. According to work by John Sutton of the London School of Economics, more than half of Chinese suppliers to multinationals now meet international standards, which permit no more than 100 defective parts per million. Even the suppliers' suppliers have shown dramatic improvements in recent years. In 2006, 80% of these second-tier firms could meet the international standard, compared with just 28% three years before.

Perhaps China's industries are not that “modular” after all. The concept describes computer-making better than carmaking, and even within the computer industry, it characterises desktops better than laptops. Squeezing lots of components into a notebook PC is not straightforward, Messrs Dedrick and Kraemer point out. It requires collaboration between designers, parts-makers and assemblers, so that the final package is thin, light and “does not burst into flames”. For this reason, the stages of laptop production tend to follow each other, with a lag, around the globe. Once assembly moved to Taiwan in the 1980s and 1990s, it pulled many other tasks (process engineering, pilot production, testing, prototyping) along after it. They foresee the same thing now happening in China.

China's quick evolution is also due to the other big difference between this latecomer and South Korea or Japan: the beguiling power of its home market. Foreigners are infatuated with it as a place to sell things as well as make things, and China's government has taken full advantage. In some cases, it required multinationals to enter into joint ventures with local firms. In others, it required foreigners to buy from them. Multinational carmakers wanting to set up shop in China in the 1990s had to source 70% of their parts locally within

three years. That gave them every incentive to tutor their Chinese suppliers.

China had to abandon such tactics to join the World Trade Organisation (WTO) in 2001. But by now, foreign carmakers are mostly happy to buy local parts, because the suppliers are up to scratch. (Foreign toymakers may no longer agree.) Indeed, in many sectors foreigners have bought into Chinese partners, as well as bought from them. In a 2001 survey in five Chinese cities, the World Bank found that 90% of companies that dealt with foreign firms were also partly owned by them. China's modular manufacturers may be part of the family after all.

Purchasing parity

In his gloomier moments, Duncan Clark of BDA, a telecoms-advisory firm in Beijing, thinks that China's biggest contribution to technology will be new sets of perplexing initials. Not content with DVD, the government introduced its own format for video discs, EVD. Unhappy with MPEG-4, it created an alternative standard for compressing audio and video files called AVS. Dissatisfied with the "Wi-Fi" encryption method that everyone else used, it tried to push an alternative called WAPI, an acronym that enfolds another acronym: Wireless Local Area Network (WLAN) Authentication and Privacy Infrastructure.

China's latest gift to the world is the longest string of initials of all: TD-SCDMA (Time Division-Synchronous Code Division Multiple Access, if you must). Developed by China's Datang and Germany's Siemens, this allows third-generation (3G) mobile phones to send and receive bigger gobbets of information, including video and webpages. Two alternatives are already widely used worldwide. Why abuse the alphabet further?

Having enjoyed little success fostering national champions, China's government is

now keen to push national standards. Such standards take hold in many high-tech industries, ensuring that one device is compatible with another. But they do not emerge without a fight. Countries quarrel over whether their neighbour should adopt their standard, or they should adopt their neighbour's. If the neighbour has many more users, its standard will probably prevail. That is the lot accepted by most small countries. But China is not small. Given the size of its home market, it can realistically aspire to carry its own standard.

In so doing, it hopes to escape what it thinks of as a "technology trap", argue Richard Suttmeier and Xiangkui Yao of the University of Oregon and Alex Zixiang Tan of Syracuse University. Its pragmatic manufacturers often favour foreign components and technologies, which leaves home-grown innovation bereft of patronage, and burdens the economy with hefty licence fees and royalties: Chinese firms paid \$465m to American intellectual-property owners last year, for example. Rather than pay such fees, some firms bootleg the technology, undermining intellectual-property rights, which further saps China's innovative energies.

China's 15-year programme for science and technology, unveiled in 2006, called for "indigenous" innovation and aimed to cut China's dependence on foreign technology from 60% to 30% (as measured by the ratio of its technology imports to its domestic R&D spending plus net technology exports). By pushing for its own standards, based on home-grown research, it hopes to cut its royalty payments and wean its companies off foreign innovation.

China's big market is, to be sure, a great boon to its technological ambitions. But not in quite the way the government thinks. The clout it confers in standard-setting is of secondary importance. The benefits of a

large pool of curious customers run far deeper than that.

Much technological innovation takes place in the back-and-forth between maker and user. This is an old insight—Adam Smith praised the workmen who invented “easier and readier” tools for their own use. Today, the idea is most closely associated with Eric von Hippel of the Massachusetts Institute of Technology, who likens innovation to a democratic forum, where users are sovereign.

Adventures in consumption

Amar Bhidé, an economist at Columbia University, goes so far as to say that an economy's technological standing rests as much on its consumers as its producers. “Venturesome and resourceful customers” provide a great spur to innovators, he says, offering them quick feedback on their ideas, and a full deck of behaviours, habits and trends to learn from.

China's consumers are as venturesome as any. The country is still deeply curious and optimistic about what technology can do, says Tsinghua University's Mr von Zedtwitz. He thinks both qualities have faded in Europe. Likewise, at Microsoft Research Asia in Beijing, Jian Wang believes the Chinese consumer is a gift to free-thinking researchers: “People here just love new technology,” he says. “They love to try new things.”

Microsoft is exploring what it calls “deployment-driven research”. Rather than perfecting a product behind closed doors, then releasing it shrink-wrapped to the world, it thinks research work should zig and zag between author and audience. They do not call it R&D. But this is already what many Chinese firms do in practice. They are quick to test their ideas, says Mr von Zedtwitz, boldly putting their products into customers' hands, while German

perfectionists would “still be fiddling around with the prototype”. In China, he says, “you can afford to waste some customers with an imperfect product, because there are always another 100m out there to whom you can sell version 2.0.”

China's push for a 3G standard has deprived its companies of the benefits of this venturesome consumption. Despite promising to finish a 3G network by the time of the Beijing Olympics next year, the government has yet to issue licences for 3G telephony. It does not want to uncork the market until its standard is ready, whenever that may be. As a result, China makes many of the world's 3G smart-phones, but almost none of the world's 3G phone-calls. Apart from a few TD-SCDMA pilots in big cities, China has no 3G consumers to learn from. The government has in effect kept the doors of its biggest laboratory shut.