It can easily appear as if China can make anything. Yet it makes goods not only at low cost, but now also of high quality, and this constitutes a particularly Chinese brand of innovation that enables China increasingly to shake up global markets. After coming of age in China’s domestic markets, Chinese firms are now replicating their domestic success in global markets by competing on price and quality. The success of the likes of Huawei and Lenovo are indicative of an emerging trend of Chinese technology and innovation, yet China’s emergence is only just beginning.

The export processing zones established in China in the 1980s initiated a complete transformation of China’s coastal regions. The export processing trade, supported by a strong manufacturing base established in the 1950s and complemented by technology imported since the 1980s, progressively became a catalyst for China’s economy. Following in the footsteps of other Asian catch-up countries, China’s exports rapidly started moving up the value chain away from low-tech products. Between 1992 and 2005, China’s medium- to high-technology exports grew 22 per cent annually, while high-technology exports grew by 32 per cent. By 2008, 43 per cent of China’s exports were directly related to machinery, mechanical appliances and electrical equipment, and China now dominates the global markets for these and other types of machinery.

**A tale of two firms**

In the 1980s the southern Chinese province of Guangdong became a national experiment for combining foreign investment and technology with the cost advantages of Chinese labour. By 2008 it accounted for 31.5 per cent of China’s exports, yet only 10.9 per cent of the national total for R&D. Almost all R&D expenditure in the province is directed at the electronics and telecommunications equipment subsectors, and most of this is largely attributed to a single firm: Huawei Electronics. Huawei has come to personify the global emergence of Chinese technology and innovation. Consistently spending 10 per cent of its revenue on R&D every year, the company was recently described by BusinessWeek magazine as one of the world’s most influential firms. The firm’s credentials as an innovator are beyond question, yet its greatest achievement is that it so effectively fused two often disparate elements: good quality at low prices.
In 1988, China's first high-technology zone was established in the Zhongguancun (ZGC) suburb in north-western Beijing with government support. The type of governance implemented in high-technology zones like ZGC was based on a model called 'smaller government, more services'. This strategy envisaged the creation of an organic link between scientific research and industrial production, giving firms and institutions an incentive to innovate. As a complement to this, growing numbers of state-owned enterprises (SOEs) converted to non-state ownership and commercial for-profit forms, and many government research institutions also branched out into business. Initially, Legend Computer (renamed Lenovo in 2003) served as a trading company for foreign merchandise. The company's first product was an add-on card that enabled computers to input Chinese with a standard keyboard. By the late 1980s, Lenovo had begun to assemble and sell computers under its own brand. The company maintained a close relationship with the Chinese government, yet it also forged partnerships with foreign firms, most notably HP, from which it absorbed crucial business and managerial know-how while collaborating to market HP's products in China. At the time, foreign MNCs in China's personal computer market did not sell their latest products due to estimates of the weak purchasing power of Chinese users. The management of Lenovo, however, understood the desire of Chinese users to access up-to-date products. By the 1990s it had built up sufficient expertise to mass-produce the latest computers, and began selling them at prices substantially lower than those of any foreign competitor. Lenovo quickly became the leading computer brand in China, enjoying a 30 per cent share of the domestic market in the 2000s. Like Huawei, Lenovo excelled by absorbing foreign technology and business expertise, and adapting them to a Chinese context before extending the same strategy into global markets.

**Upstarts**

Foreign firms currently still retain a strong presence in China's high-tech exports and patents. While domestic patent applications to the Chinese State Intellectual Property Office expanded nearly sixfold between 1995 and 2006, patents granted to Chinese nationals have been mainly non-invention patents (in the form of utility models or appearance-based designs). Yet to address this state of affairs, China has set out its ambitious vision to become a global technology leader in its medium to long-term science and technology (S&T) strategic plan 2006-2020 (MLP). In essence, the MLP aims to reduce China's reliance on foreign technology to less than 30 per cent by 2020; to increase GERD (gross domestic expenditure on R&D as a percentage of GDP) to 2 per cent by 2010 and to 2.5 per cent by 2020; to have S&T and innovation contribute 60 per cent to GDP growth, and for China to be among the top five worldwide contributors to domestic patents and international citations in scientific papers.

Significant progress has already been achieved with the MLP, and it is not hard to identify signs of China's rapidly improving innovative abilities. GERD increased to 1.54 per cent in 2008 from 0.57 per cent in 1995. Occurring at a time when its GDP was growing exceptionally fast, China's GERD now ranks behind only the US and Japan. The number of triadic patents (granted in all three of the major patent offices in the US, Japan and Europe) granted to China remains relatively small, reaching 433 in 2005 (compared to 652 for Sweden and 3,158 for Korea), yet Chinese patent applications are increasing rapidly. Chinese patent applications to the World Intellectual Property Office (WIPO), for example, increased by 44 per cent in 2005 and by a further 57 per cent in 2006. From a total of about 20,000 in 1998, China's output of scientific papers has increased fourfold to about 112,000 as of 2008, moving China to second place in the global rankings, behind only the US. In the period 2004 to 2008, China produced about 400,000 papers, with the major focus areas being material science, chemistry, physics, mathematics and engineering, but new fields like biological and medical science also gaining prominence.

China's emergence since 1978 has impacted the world to an extent that seems almost impossible to grasp in its entirety. Chinese companies are now becoming very successful at replicating their low-cost business models and exporting their products and services to the rest of the world.
cost manufacturing prowess on a global scale, but at
good quality and with constantly improving
technology. There is no way of telling how far China
will go as a global leader in technology and
innovation - China’s global emergence in
technology is just beginning.

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