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China is on the Path to quickly Build a Knowledge Society if it can overcome its biggest challenge – the reform of its education system

This is the last of our trilogy of analyses looking at important, and very common, misperceptions about China:

- [Slowing growth makes China a less attractive opportunity than previously \(or than other emerging markets\)](#)
- [Fast rising wages mark the end of low production costs in China](#)
- **China copies intellectual property and will not turn into a scientific and technological power**

Throughout history, Chinese civilization was used to being the most advanced society of its known environment. Many historians agree that from the 8th to the 14th century, China was the world's innovation leader. Iron furnaces, paper, printing, the compass, gunpowder, clocks, fixed ruder ships, are a few of the inventions we owe to the Chinese. China was the initial center of civilization in the East and its culture spread throughout Asia. Around 1820, when industrial revolution got in full swing in Britain, China's size also made it the economic superpower of the time: it accounted for no less than 30% of world GDP. While the term 中国 *zhong guo*¹, the name the Chinese gave to their country, was translated in the West by the "Middle Kingdom", the general concept of the term originates from the belief of the ancient Zhou Dynasty, being the "centre of civilization" or "centre of the world".

It is then no wonder that the Chinese were deeply surprised and shocked by the ease with which comparatively small foreign nations could suddenly defeat them. Beijing was conquered in 1860 by less than 10'000 British and French troops. In 1900, 20'000 soldiers from the 8-Nations³ Alliance landed in Tianjin and made their way to take control of Beijing with little losses, at a time when China already had a population of 450 million. China started to realize that size is an advantage, but no match by itself to advanced technology and organization. If China was to maintain its independence and its position in the world, it needed to bridge the science and technology gap with developed nations as fast as possible.

Defense and economic development: the initial priorities in technology building

So that the humiliations of the 19th Century would never be repeated, the first scientific priority of the Communist Party in the 1950s was the acquisition of nuclear and aerospace technologies, key to the country's military position. In 1964, four years after France, China detonated its first atomic weapon. Though there was technology transfer from the Soviet Union from 1956, all Soviet support was interrupted in 1960 and China largely developed alone its missile and nuclear deterrent program⁴.

After the Cultural Revolution (1966 – 76) brought the country to the verge of economic collapse (and delay to China's Science & Technology (S&T) development⁵), S&T was assigned a key role in China's "New Long March" towards the creation of a modern socialist society by the year 2000. In a speech to the National Science Conference in March 1978, Deng Xiaoping declared:

The crux of the Four Modernizations⁶ is the mastery of modern science and technology. Without the high-speed development of science and technology, it is impossible to develop the national economy at a high speed.

¹ 中 zhong: middle, center; 国 guo: state, nation

³ Russia, Japan, Germany, England, France, the USA, Austria-Hungary and Italy

⁴ For reference, China is however the only nuclear nation having a unilateral "no-first-use" doctrine for nuclear weapons.

⁵ Universities closed from 1966 to 1970 and non-military research restarted only in 1977.

⁶ Modernization of agriculture, industry, science and technology, and national defense.

Forty years later, Chinese companies have come a long way from sewing garments and making components according to foreign designs. Huawei and ZTE are world leaders in internet and telecommunication equipment and regularly rank among the top 3 firms filing the most number of international patents. And while Intellectual Property (IP) infringements are still frequent, they are definitely not as ubiquitous as the western press relates. An excellent illustration of this situation is how executives at foreign firms in China rate their concerns. In the latest CEIBS survey⁷, IP infringements ranked much lower as a challenge, than for example support from the head office:



Overcoming development challenges and building a harmonious society through scientific development

Today, there is a third reason for growing a strong and independent scientific sector in China. The last 30 years of very fast development have been reckless in some respect and have created unprecedented challenges for the country. To name a few:

- Environmental degradation is threatening the very life of citizens. Since Beijing publishes details of its particulate matter air pollution, levels are regularly been over the hazardous limits. Besides, food safety has become the number one concern of ordinary Chinese.
- From being one of the very egalitarian countries less than two generations ago, China has now turned into one of the most unequal societies of the world (more so than the USA according to the recently published Gini coefficient). To reduce social disparities between the interior and the coast, development cannot stop, but the task is barely imaginable, particularly in light of the environmental situation: two coal power stations come online every month. One new nuclear plant is expected to come into operation every two months. To picture the amount of development still to be done, compare the following: China has 452 airports while Brazil with a population of 200 million has 713 and the USA has 5194.
- Raising minimum salaries (84% during the current Five Year Plan) to reduce the income disparities among revenue categories. To maintain production competitiveness, automation will need to replace labor intensive assembly.
- The “get rich fast” mentality generates a business culture without ethics, becoming the source of rampant official corruption.

Due to the sheer size, complexity and interrelated aspects of the issues, Beijing is in uncharted territory: no society has faced such challenges before and there are no existing solutions to be copied and pasted. To be effective, solutions may only be developed by Chinese scientists, engineers and scholars. These will need to include new ways to use technology as well as social sciences, leadership, ethics and governance.

⁷ Business in China Survey 2013, China Europe International Business School (www.ceibs.com)

At the same time, building an innovation-driven and competitive economy

To translate vision into reality, various programs have been launched by the government. The 15 year “Medium- to Long-Term Plan for the Development of Science and Technology until 2020” is a blueprint to transform China by 2020 into an economy deriving 60% of GDP growth from innovation and spending 2.5% of GDP on R&D (the general level of Germany, Switzerland and Austria). The plan called for an intermediary target of 2% of R&D spending in 2010. China announced 1.83% in 2011: further efforts will clearly be needed to meet the target.

Specific targets are set in every Five Year Plans (FYP). The one that started in 2011 contains new elements of much interest. Most remarkable is the setting of binding targets on environmental factors. Until 2010, officials at all levels of government were bound to GDP growth results and environmental elements were only part of the “expected” results. Now and for the first time, every village, district city and province mayor and leader must deliver figures showing reduction in CO₂, water and energy consumption in order to be well noted.

For example, in these five years, CO₂ must be reduced by 17% per unit of GDP and water by 30% per unit of industrial production added value. Though GDP and industrial production will grow more than 17 and 30% respectively, these levels of efficiency improvements can only be met with considerable upgrades in the mindset of people and the ways of production. While in Europe we have implemented energy and resource saving measures since the 1970s oil shock, most of the needed technologies are not mature yet in China. The urgency to meet the targets is providing an immediate and enormous opportunity for the renewable energies and cleantech/recycling sectors.

Also in the latest FYP are the “Seven Emerging Strategic Industries” singled out for priority development:

- Energy-Saving And Environmentally Friendly Technologies
- Alternative Energy (*essentially: renewable and nuclear energy*)
- Alternative Fuel Cars
- Biotechnology
- High-End Manufacturing (*mostly: automation, precision and intelligent production equipment*)
- Advanced Materials
- New-Generation Information Technology

This prioritization in new industries stems from the realization at government levels that it is an enormous effort for China to catch up with the developed nations in established high-tech industries. Despite all efforts made in IT, China’s only international brand of PCs, Lenovo, is actually managed from the USA by former IBM ThinkPad executives. Even though China had the world’s fastest supercomputer for 6 months in Fall 2010, it was using US made microprocessors. By starting at the same time as other nations in the field of new industries, China’s leadership expects that their country will manage to take an international position in some of them.

A key test of this new leapfrogging strategy is the development of electric cars. China does not intend to challenge the position of existing nations like Japan and Korea in traditional car technologies. However, China intends to be the No 1 producer and exporter of electric vehicles, using the local market as a spring board. The target is to have 5 million e-vehicles (excluding bikes) on Chinese roads by 2020 with a base of 25’000 in Fall 2012. Even though China is already the top world producer of electric bikes/scooters, e-cars (like all the listed emerging industries) require much more advanced technologies and a lot of integration across sectors. Here again a major effort will need to be done to meet targets and foreign technologies are needed to bridge the gap.

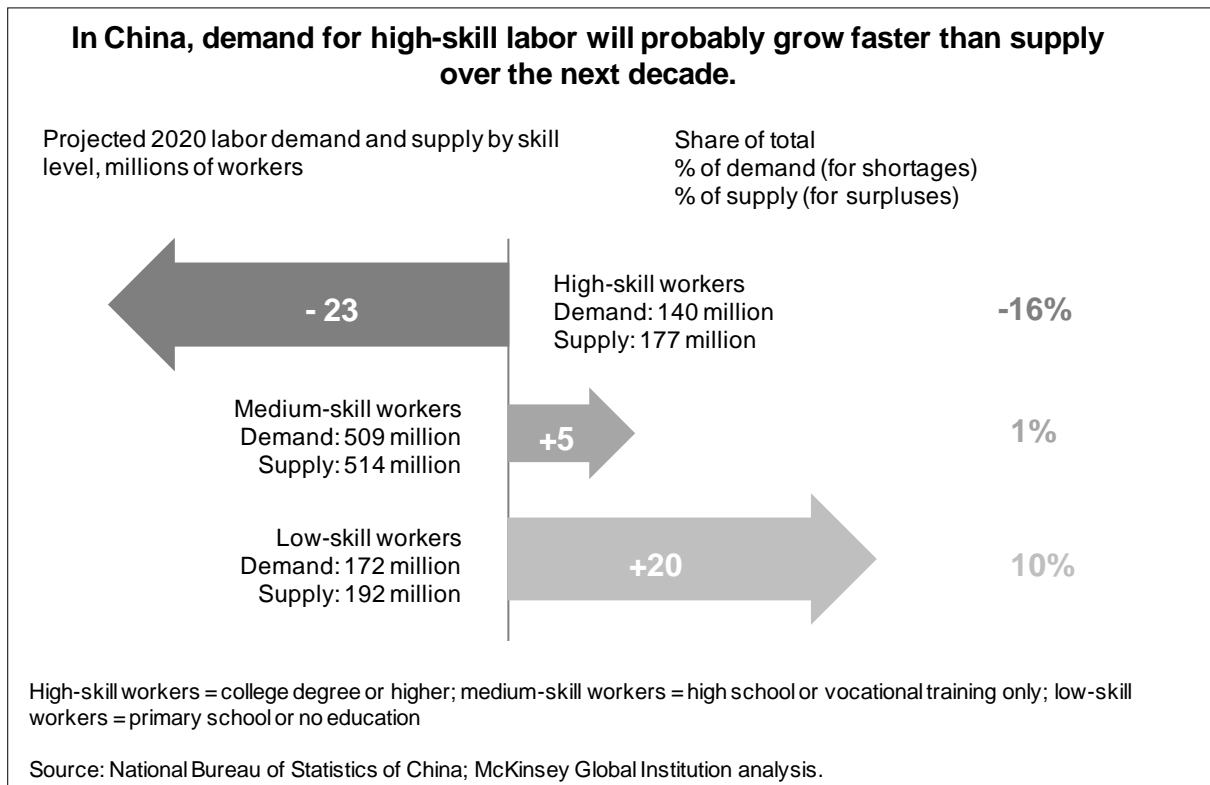
To meet its objectives, China’s government offers a series of incentives for companies (foreign and domestic) who invest in R&D, which we will take the chance to analyze practically in our next communication.

Education will be Key

Not only the CEIBS survey mentioned above (but all general surveys since several years) highlight the disproportionally high challenge for companies (both foreign and Chinese) to find and retain talent. In this year’s CEIBS survey, 70% of foreign firm executives mention talent as one of the “Greatest Management Challenges”. The second most frequently mentioned challenge (“Support from Head Office”) is a lot less important with 27% of the votes only. On the other hand, out of the 6.8 million

students who graduated in 2011 about 570'000 did not get a job a year later⁹. Taken together these facts bring the realization that China's education system is not providing the talent that its industry needs.

In addition, McKinsey estimates that the country is heading towards a considerable shortage of college graduates (23 million in 2020) and almost as many low skill workers in surplus. The obvious solution is an effort to train a lot more college graduates and to improve their adequacy to the market. This is critical because failing to do so will not only slow down the development and competitiveness of the Chinese economy, which will not be able to hire the high skilled people it needs, but it will additionally create a large new class of unemployed workers for whom the Chinese promise of a better life will remain unfulfilled, accompanied by all the related disenfranchisement and social problems.



Finding, training and retaining the right human resources will remain a key, long term competitive advantage in China for the firms that manage it well and we can only encourage you to develop a strong HR management and strategy.

We hope that the above can be of support for your China strategy and plans. For more information about this topic, do not hesitate to contact n.musy@ch-ina.com.

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⁹ *Jobless college graduates trigger concern*, China Daily, 7 November 2012