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China 360

Innovated in China: New frontier for global R&D

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For much of the past 30 years, manufacturing investment has been the driving force behind the foreign direct investment (FDI) landscape in China, and China has developed a global reputation as the factory of the world. During this time, Chinese companies were typically not viewed as true innovators; foreign companies, for the most part, kept their advanced designs and products off-shore.

However, the focus of China's government, domestic companies, and global corporations alike, is now clearly shifting toward research and development (R&D) – especially R&D in China, for China, and for the rest of the world. With strong support from the 12th Five-Year Plan, and underpinned by corporations' need to innovate their way to success in a competitive market, R&D activities in China are entering a new era.

Multinational companies (MNCs) and foreign-invested enterprises (FIEs) are increasingly locating key R&D activities in China, not only because of tangible business advantages (and incentives), but also to be closer to the ever-expanding Chinese market. While it is commonly known that China has surpassed the US to become the world's largest manufacturing nation, it will come as a surprise to many that China may soon become the world's global R&D investment leader as well.

This month's *China 360* examines the new R&D landscape in China, including some emerging R&D hot spots and available incentives. The article will also explain some of the advantages and challenges of setting up R&D centers in China, as well as the current and historical trends that support growth of China-based R&D activities.

The China R&D attraction

China is quickly rising up the global ranks in a number of intellectual property-heavy sectors, from healthcare and biotech, to high-tech manufacturing, information technology, and alternative energy. In the last ten years, R&D investment in these sectors has been significant, and the number of MNCs setting up R&D centers in China continues to rise. Since 2000, the number of foreign-invested R&D centers has increased from under 200 to over 1,300.[1]

R&D spending in China is rising as a result. In 2011, China passed Japan to place second in the world for total R&D spending,[2] and in 2013, China is expected to spend approximately USD220 billion. While this still places China a distant second behind the US (the 2013 forecast is USD424 billion), based on current R&D growth trends, China is on track to overtake the US in about 10 years;[3] according to a United Nations report, China had already surpassed the US to become the world's 'most attractive' destination for R&D investment.[4]

[1] 'World to gain from an innovative China'. *The Business Times*, July 11, 2011. http://www.businesschina.org.sg/en.php/resources/news/317/1

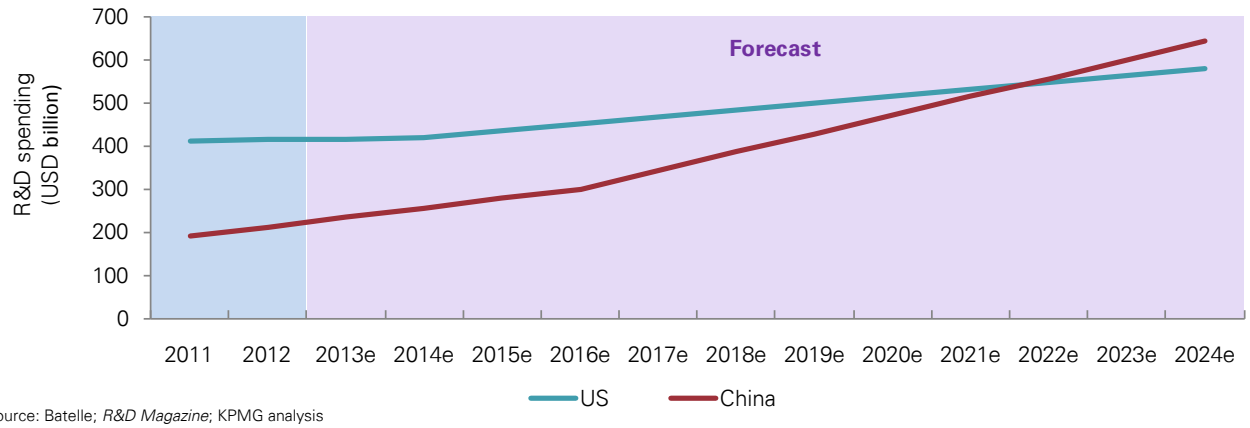
[2] Naik, Gautam. 'China surpasses Japan in R&D as powers shift'. *The Wall Street Journal*, December 13, 2010. http://online.wsj.com/article/SB10001424052748703734204576019713917682354.html

[3] Thibodeau, Patrick. 'China set to surpass U.S. in R&D spending in 10 years' *Computerworld*, December 24, 2012. http://www.computerworld.com/s/article/9234976/China_set_to_surpass_U.S._in_R_D_spending_in_10_years_

[4] 'Building successful research and development centers in China'. Russell Reynolds Associates http://www.russellreynolds.com/zh-hans/content/building-successful-research-and-development-centers-china

Although R&D and innovation has arguably not been a significant driver of China's development in recent decades, a number of factors are underpinning increased R&D activity. Increasingly sophisticated local tastes and technology standards in China, and the need for Chinese companies to compete in the global market are among the drivers for Chinese R&D. The government has not only made massive investments in technology and industrial parks to support and facilitate the move toward indigenous innovation, they have introduced policies to create an environment that will attract and sustain R&D investment in the future.

Annual and projected R&D spending, US and China



Source: Batelle; *R&D Magazine*; KPMG analysis

Ongoing policy reform favors R&D in China

Around 10 years ago, China began to reform its legal environment and offer attractive benefits for R&D investments. In 2006, China's government released the 'National Medium- and Long-term Program for Science and Technology Development' (2006-2020). Some of the goals of this Program were to:

- increase R&D expenditure as a percentage of GDP to 2.5 percent by 2020
- derive more than 60 percent of China's economic growth from technical progress by 2020
- position China as fifth in the world for patents and citations of publications worldwide.[5]

Subsequently, in the last decade employment in the R&D sector in China increased from about one million to 2.8 million, while R&D as a share of GDP doubled, from 0.8 percent to 1.75 percent.[5] This compares favorably to many other developing nations, such as Brazil, Russia, and India, whose R&D contribution as a percentage of GDP were 1.2 percent, 1.2 percent, and 0.8 percent respectively.[6]

Policies and guidance to support intellectual property rights (IPR) have also been significantly upgraded in the last decade. Since the implementation of a national IPR strategy in 2008, China's leading companies have focused on strengthening their capabilities in IPR creation, utilization, protection, and management. In addition, the implementation of national plans to protect IPR, such as the 12th Five-Year Plan on National Intellectual Property Development (2011-2015) and the 12th Five-Year Plan for Patent Examination (2011-2015), have increased the confidence of foreign-invested enterprises conducting R&D in China.[7]

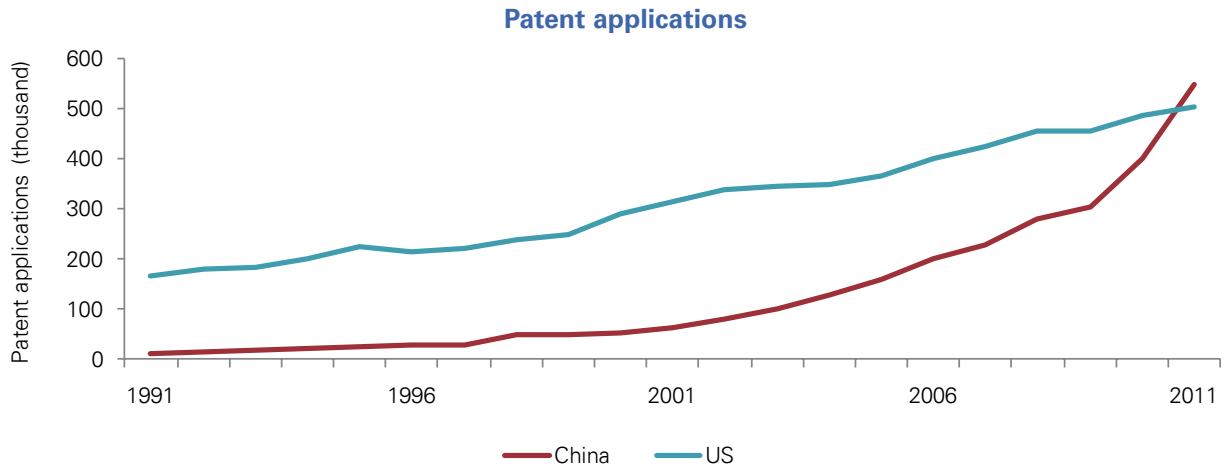
More favorable policies and IP protection measures have contributed to an increase in the number of applications for patents and inventions in China. In 2011, China reported 525,000 patent filings, compared to just over 500,000 for the US. Only a year earlier, China ranked a distant second to the US, with approximately 400,000 patent applications versus 490,000 in the US.[8] While some have challenged the numbers as potentially reflecting quantity rather than quality of innovation, the trend shown in the graph below is clear.

[5] Fabre, Guilhem and Stéphane Grumbach. 'The world upside down, China's R&D and innovation strategy'. Fondation Maison des sciences de l'homme, April 7, 2012. http://hal.inria.fr/docs/00/68/63/89/PDF/FMSH-WP-2012-07_Fabre-Grumbach.pdf

[6] Garcia Herrero, Alicia, and Fielding Chen. 'Innovation: Where does China stand?' *Economic Watch*, June 8, 2012. BBVA http://www.bbvaresearch.com/KETD/fbin/mult/120608_ChinaWatch_Innovation_EN_tcm346-332809.pdf?ts=2082013

[7] Bin, Yang. 'It pays to know where you stand on R&D'. *China Daily*, November 23, 2012. http://usa.chinadaily.com.cn/weekly/2012-11/23/content_15952428.htm

[8] Garcia Herrero, Alicia, and Fielding Chen. 'Innovation: Where does China stand?' *Economic Watch*, June 8, 2012. BBVA http://www.bbvaresearch.com/KETD/fbin/mult/120608_ChinaWatch_Innovation_EN_tcm346-332809.pdf?ts=2082013



Source: Garcia Herrero, Alicia, and Fielding Chen. 'Innovation: Where does China stand?' *Economic Watch*, June 8, 2012. BBVA http://www.bbvaresearch.com/KETD/fbin/mult/120608_ChinaWatch_Innovation_EN_tcm346-332809.pdf?ts=2082013; KPMG analysis

Incentivizing foreign-invested entities

Governments from different countries can choose among various tools to attract and expand R&D business activities. They can offer direct support via government grants and procurement, or they can use a more indirect approach by offering fiscal incentives, such as tax holidays and credits. China is pursuing a multi-pronged approach that includes government policy measures to support R&D efforts, as well as a number of attractive tax measures to incentivize R&D investment.

These incentives may include:[9]

- reduced corporate income tax rates (15 percent versus 25 percent) for 'high and new technology enterprises'
- a super deduction of eligible R&D expenditures (expense deduction of 150 percent versus 100 percent)
- tax concessions for advanced technology service enterprises
- customs duty and value-added tax exemption/ refund for purchases of R&D equipment, and
- concessions for technology transfers.

There may also be additional local or municipal subsidies available when investing in specific cities in China. The following are two examples:

- In 2009, Shanghai's municipal government introduced subsidies for corporations engaged in pharmaceutical research and development. Shanghai approved a 10 percent government subsidy for additional investment in biomedical or biopharmaceutical research, development, and production. The subsidy can be increased to 30 percent of an investment in new technologies that represent a major breakthrough, or in the construction of a public research platform.[10]
- In Chongqing, as well as other western areas of China, local and municipal subsidies may be granted to companies supporting government-backed industries. For example, a 15 percent income tax rate is available for enterprises established in the western regions of China engaged in industries supported by national policy, which includes research and development. In addition, Chongqing's local government may grant financial subsidies for 'new products' developed in Chongqing.[11]

[9] 'Securing R&D tax incentives in China'. KPMG, October 2012. http://www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/Pages/Securing-Research-Development-Tax-Incentives-in-China-201210.aspx

[10] 'Development of Shanghai's pharmaceutical industry'. Information Office of Shanghai Municipality, May 28, 2013. http://en.shio.gov.cn/presscon/2013/05/28/1152304.html

[11] 'Chongqing new northern zone: China's inland open economy demonstration zone'. Chongqing Municipal Government, December 29, 2010. http://en.cq.gov.cn/Investors/PriorityDevelopmentRegion/2983.htm

The rise of R&D localization

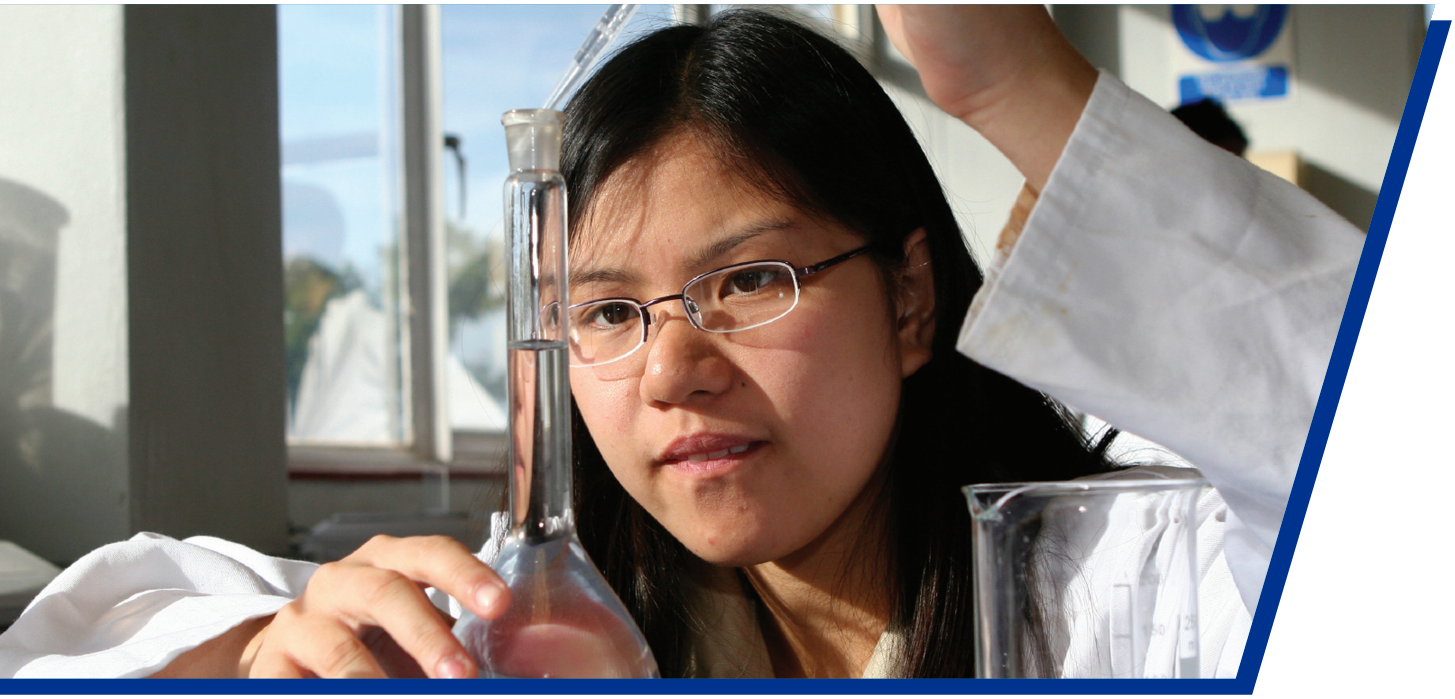
Currently, there are over 1,600 R&D centers in China,[12] with at least 1,300 belonging to multinational corporations – up from just 120 in the year 2000.[13] This number continues to rise rapidly thanks to the ongoing investment interest by MNCs: of all major multinational companies investing in R&D, 61 percent now have at least one research and development center already set up in China.[14]

A key reason behind this explosive growth is the ongoing desire for MNCs to localize products in China. For decades, the sheer size of China's market tempted many of the world's largest companies, which previously served China with products created elsewhere and adapted them for mainland sale. Today, multinationals have been moving R&D closer to their target market, not only to get closer to customers, but to better enhance their products toward local market preferences.

Some recent examples are listed below:

In 2012, PepsiCo (owner of Frito-Lay and Quaker Brands) opened its largest R&D center outside of the US, in Shanghai. Their new USD45 million facility includes kitchens where PepsiCo chefs develop new flavors suitable for the Chinese marketplace; laboratories where they taste-test the product with consumers; and plants where test batches are produced. The resulting products can hit China's shelves in as little as two weeks – and cater to Chinese customer tastes: purple sweet potato oatmeal and hot and sour fish soup-flavored potato chips.[15]

BASF is a leading chemical company servicing several diversified industries. In early 2004, BASF established the BASF Asia Technical Center in Shanghai; nine years later, they have a total of 10 R&D centers in Shanghai, and recently opened a USD75 million innovation center, also in Shanghai, which is their greater China headquarters. According to the Vice-Chairman of the BASF Board of Directors, "BASF continues to increase investment in China because the BASF product lines need to be adjusted to China requirements and tastes, and their proximity needs a more efficient location to better service customer requests."[15]



[12] Waldmier, Patti. 'China offers a taste of R&D to come'. *FT*, November 13, 2012. http://www.ft.com/cms/s/0/b568f34a-2d83-11e2-9988-00144feabdc0.html#axzz2dFSqgS11

[13] von Zedtwitz, Maximilian. 'Managing foreign R&D laboratories in China'. International Institute for Management Development (IMD). http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.195.3244&rep=rep1&type=pdf

[14] 'Building successful research and development centers in China'. Russell Reynolds Associates http://www.russellreynolds.com/zh-hans/content/building-successful-research-and-development-centers-china

[15] Waldmier, Patti. 'China offers a taste of R&D to come'. *FT*, November 13, 2012. http://www.ft.com/cms/s/0/b568f34a-2d83-11e2-9988-00144feabdc0.html#axzz2dFSqgS11

Top spots for R&D

Shanghai and Beijing are undeniably the leading cities for R&D activity by MNCs in China. Beijing has over 550 such R&D centers,[16] while Shanghai has over 350.[17] One location in Beijing – the Zhongguancun Science Park – is the largest science and technology park in China. It houses nearly half of all R&D centers in Beijing, and is often referred to as 'China's Silicon Valley'.[18] Top MNCs include: Hewlett-Packard, Samsung, IBM, Motorola, Sony, Microsoft and Sun Microsystems.

Although Beijing and Shanghai remain the two largest cities for research and development, local governments from tier-two and tier-three cities are actively offering incentives to locate new or transferred R&D operations to their cities. Xi'an, Chengdu, and Chongqing, all in the interior of China, are attracting greater foreign R&D interest and investment. Recent moves by MNCs toward these tier-two cities can be seen below:

IBM – In 2010, IBM announced the opening of their rational software analyzer lab and regional software growth center in Xi'an. It opened with 200 employees but plans to continue its expansion for the next 10 years. Currently IBM operates seven regional software growth centers in China, comprising: Xi'an, Nanjing, Jinan, Wuhan, Hangzhou, Shijiazhuang and Shenyang.[19]

Applied Materials – In 2009, Applied Materials opened a 400,000 square foot solar technology center in Xi'an. Applied Materials is the world's largest supplier of equipment to the photovoltaic industry, and believes that this facility will help improve industrialization of its solar modules and scale production to lower cost.

EMC – In 2011, EMC announced that it had established its third R&D center in China, located within the country's largest professional software park in Chengdu. The new facility aims to better service Southwest and Northwest China, promote business development in the region, and attract international talent due to its highly livable environment. According to EMC management, the local talent pool from universities and research institutions was "better than corporate expectations",[20] and they expect to benefit from local talent – which is often cheaper than talent in Beijing or Shanghai.

R&D in China – Challenges and upsides

In the past, due to a lack of qualified technical personnel, MNCs might have had doubts about setting up R&D centers in China. This situation has drastically changed, as China is the biggest 'producer' of science graduates in the world. Currently, there are more than seven million[21] new university graduates per year (and rising) in China. Approximately 900,000 of these are engineering majors, compared to only 80,000 in the US.[22]

However, expectations that a Chinese R&D facility will come with a small price tag may be a bit dated. Although construction, plant, and property costs are still quite low in China, particularly away from the coastal regions, salary costs for skilled R&D staff may not be as minimal as some may expect. While junior staff may be 25 to 30 percent cheaper than in the US or Europe, costs for middle managers may be comparable, while packages for senior managers may actually be 20 to 25 percent higher.[23] This is due to a short supply of senior R&D managers in China, as well as relatively strong demand from both local and MNC rivals, who will bid up potential employee salaries to land highly skilled senior R&D management in their facility.

[16] *Beijing Evening News*, July 16, 2013. http://bjwb.bjd.com.cn/html/2013-07/16/content_90345.htm

[17] *Xinmin Evening News*, July 26, 2013. http://xmwb.xinmin.cn/xmwb/html/2013-07/26/content_2_3.htm

[18] *Xinhuanet*, September 12, 2012. http://www.bj.xinhuanet.com/zt/2012-09/12/c_113057327.htm

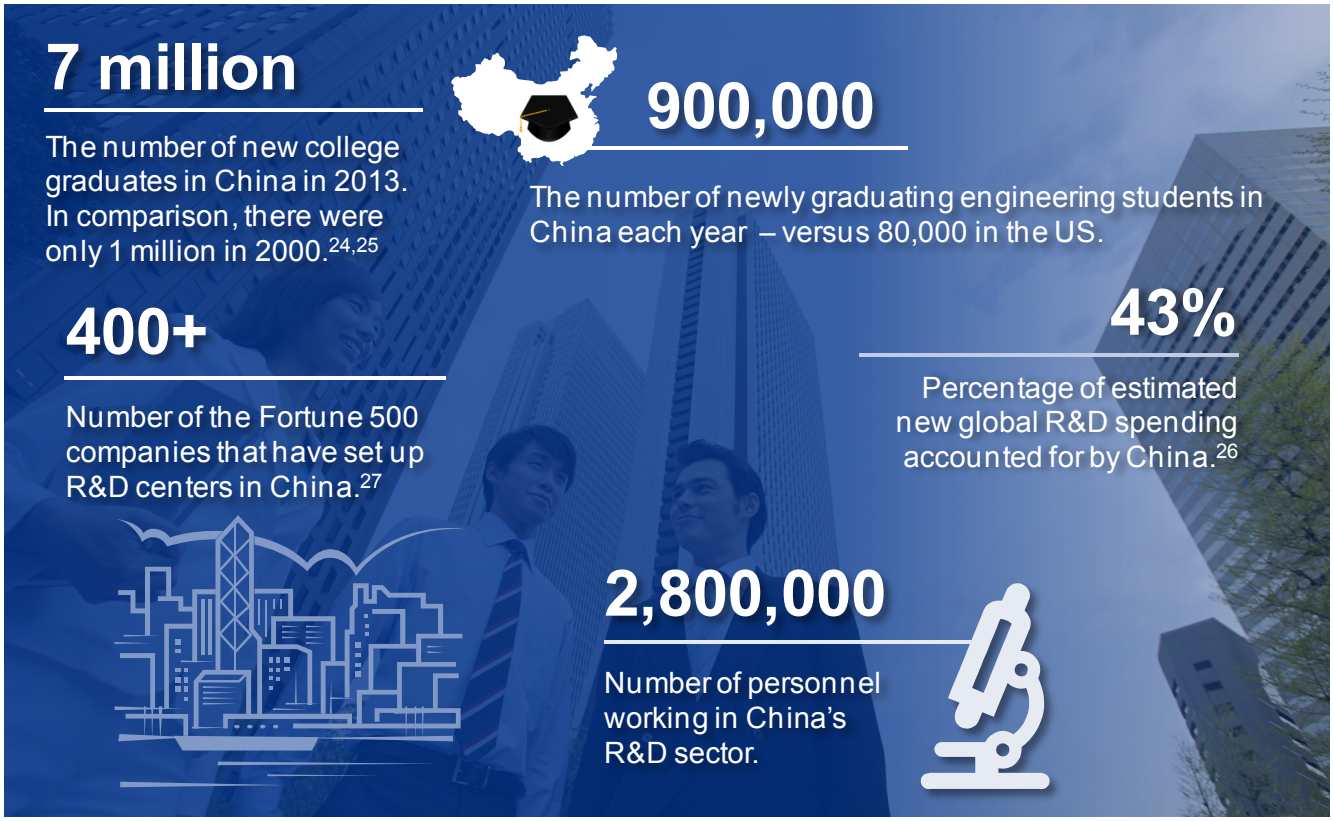
[19] 'IBM launches R&D center in Xi'an'. *Global Times*, March 23, 2010. http://www.globaltimes.cn/business/industries/2010-03/515313.html

[20] 'EMC opens R&D center in Chengdu Tianfu Software Park'. Tianfu Software Park http://www.tfsp.cn/en/news/reports/2544-emc-opens-rad-center-in-chengdu-tianfu-software-park-.html

[21] '7 million China colleage graduates are working hard to find job'. China Navis, May 16, 2013. http://www.chinanavis.com/7-million-china-college-graduates-are-working-hard-to-find-job-153608

[22] 'Number of students in regular HEIs by field of study'. Ministry of Education of the People's Republic of China. http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s7382/201305/152543.html

[23] Waldmier, Patti. 'China offers a taste of R&D to come'. *FT*, November 13, 2012. http://www.ft.com/cms/s/0/b568f34a-2d83-11e2-9988-00144feabdc0.html#axzz2dFSqgS11



[24] Garcia Herrero, Alicia, and Fielding Chen. 'Innovation: Where does China stand?' *Economic Watch*, June 8, 2012. BBVA http://www.bbvaresearch.com/KETD/fbin/mult/120608_ChinaWatch_Innovation_EN_tcm346-332809.pdf?ts=2082013

[25] '7 million China colleage graduates are working hard to find job'. *China Navis*, May 16, 2013 http://www.chinanavis.com/7-million-china-college-graduates-are-working-hard-to-find-job-153608

[26] 'Battelle-R&D Magazine release newest global research funding forecast'. *Battelle*, December 18, 2012 http://battelle.org/media/press-releases/battelle-r-d-magazine-release-newest-global-research-funding-forecast

[27] Tiak. 'Outsouring becoming a necessity rather than a need'. Speech at the Global Services Forum, CIFTIS, May 28, 2013. http://unctad.org/meetings/en/Presentation/gsf2013_S3PanelA_Loh_en.pdf

China R&D outlook

Foreign direct investment into China continues to outpace the global economy, and R&D investment into China is playing an increasingly significant role.[28] In 2012, while many countries experienced significant FDI declines, China's FDI decreased only marginally, due in part to R&D investment into China. In 2013, global R&D spending is forecast to grow by USD53.7 billion, to USD1.5 trillion: China is expected to account for USD23 billion (or over 40 percent) of this projected growth.[29]

It is expected that the R&D investment boom in China still has many years of growth ahead. Given the diversity of sectors undertaking R&D, the continuous growth of R&D centers in China, and MNC expansion to second- and third-tier locations, it would seem that R&D as a percentage of total FDI will also continue to climb. Additionally, not only is the government (both nationally, and at the local levels) actively encouraging this form of clean, high-value added, knowledge-based investment, corporations are also finding that basing R&D activities in China provides a strong competitive boost to their ability to service a large and growing market.

[28] Ross, John. 'Why FDI into China outperformed the world'. *China.org.cn*, December 24, 2012. http://www.china.org.cn/opinion/2012-12/24/content_27500147.htm

[29] 'Battelle-R&D Magazine release newest global research funding forecast'. Battelle, December 18, 2012. http://battelle.org/media/press-releases/battelle-r-d-magazine-release-newest-global-research-funding-forecast

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