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Special Issue: China's Research Innovation Performance

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China's Research Output Growth Leads the World

China's research output has been increasing at a faster pace than the U.S., stated Science Resources Analyst Derek K. Hill at the National Science Foundation (NSF) in the latest supplement of Nature Index 2015 Global. According to the supplement, China's contribution to global high-quality research output increased by 16% from 2013 to 2014, the fastest increase in the world. The Chinese Academy of Sciences became the single most productive institution worldwide in the Nature Index, with a leading position in the three disciplines of chemistry, physical sciences and earth and environmental sciences.

The Index covers 57,501 papers published in 68 world-class research journals from January 1 to December 31, 2014. According to the Index's weighted fractional

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count (WFC), China ranks second in the world, next only to the U.S., and followed by Germany, Britain and Japan. China's WFC increased 16% in 2014 over 2013, versus negative growth for all the other countries in the top five. And China's double-digit growth in WFC has been consistently on an upward trend, with its WFC in 2013 increasing by 14.9% compared to 2012. In addition to the Chinese Academy of Sciences which ranks as the No. 1 research institution in the world, five Chinese universities including Peking University, Tsinghua University, Nanjing University, University of Science and Technology of China and Zhejiang University rank among the Nature Index Global Top 50.

According to the Index, China has staged a strong performance in research output in chemistry and physical sciences, contributing a total of 147 papers to Nature and Science in 2014, taking a lead over Japan. And these papers had a greater focus on subjects outside the traditional domains of chemistry and physical sciences. This, according to the report,shows that Chinese researchers' strength in basic research and pioneering spirit. China's continuous growth in high-quality research output has been impressive. These figures clearly indicate that more and more high-level research projects have been initiated, conducted and completed in China and the number has been rapidly increasing. The Nature Index, published for the first time in 2014, tracks papers published by authors and research institutes in 68 global leading science journals. These journals, selected by an independent panel comprised of active scientists, are their most favored ones for publication of their research results.

(Source: Science and Technology Daily,
June 19, 2015)

National Innovation Index Report 2014 Published

The National Innovation Index Report 2014 prepared by the Chinese Academy of Science and Technology for Development (CASTED) was officially released on July 8, which comprehensively evaluates countries' innovation capacity and development trend in terms of innovation resources, knowledge creation, enterprise innovation, innovation performance and innovation environment. According to the report, China's overall innovation capacity in 2013 remained unchanged at 19th place, being the only developing country in the top 20 list. Although its ranking remained unchanged, China's National Innovation Index score increased over the previous year by 3.2 points to 68.4, leaving third-echelon countries like Canada, Luxembourg and New Zealand further behind. Meanwhile, China's gap with Belgium in 18th place narrowed substantially from 3 to 1. China's progress in the second echelon with the most intense competition has been mainly attributed to its steadily increasing R&D spending. In 2013, China's R&D intensity surpassed 2%, reaching 191.21 billion dollars, overtaking Japan for the first time and rising to the second place in the world.

R&D intensity is a comprehensive indicator of a country's investment in S&T innovation. Continuously increasing R&D spending is crucial for maintaining the stability of a country's R&D workforce and represents a core factor of the steady growth of national innovation capacity. According to the history and experience of developed countries, the improvement of a country's innovation capacity is a long-term process accompanied by a gradually increasing R&D/GDP ratio, i.e. R&D intensity. Currently, the R&D intensity of nearly 20 technologically and scientifically advanced countries such as the U.S., Japan, Germany and France is above 2%. In 2013, China ranked second in terms of the number of SCI papers and first and second respectively in terms of domestic invention patent applications and grants. China's SCI papers have been steadily improving in quality and growing in quantity. While China is world leading in terms of domestic invention patent application and grant, its high-level patents are not of a large amount. Some local governments, out of good intentions, set up special awards to encourage enterprises to file patent applications, but the awards have been often abused by some patent application agencies that provide one-stop services to help

enterprises apply for patents which are insignificant and then share the awards with the enterprises.

According to China's National Program for Medium- and Long-term Science and Technology Development, China aims to become an innovative country by 2020. The National Program for Science and Technology Development during the 12th Five-Year Plan Period states expressly that the overall goal of China's scientific and technological development at this period is to improve its international ranking of national innovation capacity from 21st to at least 18th. Goals in five of the ten indicators specified in the 12th Five-year S&T Development Plan have been accomplished ahead of schedule, and they are: "science paper citations", "invention patent filings", "total R&D personnel per 10 thousand population" and "national technology transaction volume". Of the indicators where the goals have not yet been met, the international ranking in national innovation index is only one place away, and the two indicators of MFP contribution on economic growth has been improving steadily and only 0.11 percentage point and 1.9 percentage points, respectively, from the goals. The ratio of added value of high-tech industries to that of manufacturing has reached a historical new high of 16.7%, only 1.3 percentage point higher than the 18% goal, with the target growth margin having been completed by 3/4.

(Source: Science and Technology Daily, July 9, 2015)

China's Innovation Capacity Ranks 19th Globally

China's innovation capacity has been steadily improving with a further narrowed gap from innovative countries in its national innovation index scores, with its ranking in the same 19th place as in the previous year but with an improvement of 3.2 points from the score in the previous year, according to the National Innovation Index Report 2014 released by the Chinese Academy of Science and Technology for Development (CASTED) in July 8.

The global landscape of innovation has been largely unchanged, with the top ten countries being the same ones in the previous year. The top five countries – the U.S., Japan, Switzerland, Korea and Israel remained in the same places as in the previous year, with Demark, Sweden, Netherlands, Germany and Finland occupying 6th through 10th places. China's overall national innovation index score increased by 3.2 to 68.4, ranking in the second echelon in innovation capacity. The report said that China's innovation capacity has been improving steadily with remarkable improvement particularly in enterprises' innovation performance. Among the five first-level indicators of the national innovation index, China saw increase in four of them.

China has been world leading in major indicators with a promising long-term upward trend. In 2013, China's R&D spending surpassed Japan for the first time and rose to the second place in the world with 191.12 billion dollars. China's SCI papers have been steadily improving in quality as well as growing in quantity, ranking second in the number of SCI papers and fourth in the number of high-quality science papers. China ranked first in domestic invention patent filings and second in domestic invention patent grants. And it ranked second in high-technology exports as a percentage of manufacture exports and third in added value of knowledge-intensive services as a percentage of GDP.

(Source: Science and Technology Daily, July 9, 2015)

Chinese Enterprises Transformed from Factor-driven to Innovation-driven Development

The Report on Development of Chinese Innovative Enterprises 2013-2014 compiled under the auspices of the Ministry of Science and Technology, the State-owned Assets Supervision and Administration Commission and the All-China Federation of Trade Unions was released on May 27. According to the report, as of the end of 2012, 651 innovative enterprises spent 416.24 billion yuan in combined R&D spending, owned more than 140,000 patents, and had 23.3 trillion yuan in combined revenues. With constant improvement of their innovation capabilities, Chinese enterprises are entering an important period of transforming from factory-driven to innovation-driven development.

In innovation expenditure, 651 innovative enterprises spent a total of 416.24 billion yuan on R&D activities in 2012, equivalent to 69.5% of the total R&D spending of all large and medium-sized industrial enterprises nationwide, 57.8% of the total R&D spending of all industrial enterprises above designated size, and 54.6% of the total R&D spending of all enterprises nationwide. The 651 enterprises' R&D intensity reached 1.79%, far higher than 0.99% of large and medium-sized industrial enterprises and 0.77% of industrial enterprises above designated size. Among the 651 enterprises, six had a R&D spending of more than 10 billion yuan. All have established their internal R&D organizations. According to incomplete statistics, the 651 enterprises have established 239 national key laboratories, 106 national engineering laboratories and 827 national certified enterprise technology centers.

With respect to innovation output, as of the end of 2012, the 651 enterprises had more than 140,000 invention patents, accounting for 70.1% of all invention patents held by large and medium-sized industrial enterprises nationwide, 51.8% of all invention patents held by industrial enterprises above designated size nationwide, and 16.4% of all invention patents nationwide. In terms of revenues, the 651 enterprises had combined revenue of 23.3 trillion yuan and combined profit of 1.4 trillion yuan, equivalent to 38.6% and 34.6%, respectively, of the total revenue and the total profit of all large and medium-sized industrial enterprises nationwide. In the Chinese Companies Top 500 of 2014 list, 51 innovative companies ranked among the top 100. And 49 Chinese innovative enterprises appeared in the Fortune 500 list of 2014.

(Source: Science and Technology Daily, May 28, 2015)

China Invention Patent Applications Ranks First for Four Consecutive Years

The number of intellectual properties maintained rapid growth in 2014 with 2.361 million applications of invention patents, utility model patents and design patents, including 928,000 invention patents, up 12.5% year-on-year, ranking first in the world for four consecutive years, according Shen Xiaoyu, Commissioner of State Intellectual Property Office (SIPO).In 2014, China granted 233,000 invention patents, with invention patents per 10,000 residents reaching 4.9 and the review period of invention patent applications shortened to 21.8 months. During the year, SIPO accepted 21,600 international patent applications under the Patent Cooperation Treaty (PCT), up 14.2% year-on-year. The Opinions on Deepening System and Mechanism Reforms and Accelerating the Implementation of the Innovation-driven Development Strategy recently issued by the State Council has further affirmed the position and role of intellectual properties in innovation. Intellectual property

represents the primary driver of innovation and serves as a bridge and link that translates R&D achievements into practical productive forces. Therefore, to protect intellectual properties is to protect innovation and to effectively use intellectual properties is to stimulate innovation.

Intellectual property rights, which are established to protect innovation, cannot be used to restrict competition and hinder innovation. The State Administration for Industry and Commerce recently issued the Provisions on Prohibiting the Abuse of Intellectual Property Rights to Preclude or Restrict Competition as a response to the increasing use or indeed abuse of intellectual property rights to preclude or restrict competition, especially in terms of Internet. Although China has put in place a comprehensive industrial policy system, its policies on competition are yet to achieve their full potential. In the context of the State Council's reforms of the administrative review system, further highlighting the role of competition policies, reducing pre-event review, and strengthening in-event and post-event supervision will play an effective role in driving economic development.

(Source: Science and Technology Daily, April 17, 2015)

China's Overseas Patent Applications Continue Growth in 2014

China's overseas patent applications increased by 18.7% year-on-year in 2014, taking a substantial lead over other major patent filing countries, according to data released by the World Intellectual Property Organization (WIPO) on March 19. China's Huawei Technologies Co., Ltd. surpassed Japan's Panasonic to become the world's largest patent applicant.

In 2014, China filed 25,539 overseas patents under the Patent Cooperation Treaty, accounting for 11.9% of the world's total and making new records in both filings and percentage of world total. China was also the only country among the top ten patent-filing countries to have a double-digit patent application growth (18.7%), followed by Britain (9%) in second place and the U.S. (7.1%) in third place. In terms of the total number of patent filings, China ranked third, next to the U.S. (61,492) and Japan (42,459).

China's Huawei Technologies Co., Ltd. became the world largest patent applicant in 2014 with the filing of 3,442 patent applications, followed by America's Qualcomm (2,409) in second place and China's ZTE (2179) in third place. In 2014, six Chinese companies entered into the list of top 50 overseas patent filing applicants, with the four companies other than Huawei and ZTE being Tencent Technology (Shenzhen) Co., Ltd. (17th place with 1,086 overseas patent filings), Shenzhen China Star Optoelectronics Technology Co., Ltd. (23rd place with 904), BOE Technology Group Co., Ltd. (34th with 553) and Huawei Device Co., Ltd. (46th with 420), respectively.

Among universities, China's Peking University ranks 19th in the world and first in China with 76 overseas patent filings, with China's Tsinghua University ranking 23rd in the world. China University of Mining and Technology also made into the top 50 overseas patent filing universities, ranking 38th with 44 overseas patent filings. Top overseas patent filing universities are mostly U.S. universities, with the University of California becoming the largest university applicant of overseas patents with 413 filings. Korea's Seoul National University was the only non-U.S. university in the top ten overseas patent filing universities, ranking in 10th place with 92 filings.

(Source: Science and Technology Daily, March 21, 2015)

China's Overseas Patent Filings Have Huge Growth Potential

Chief Economist of the World Intellectual Property Organization (WIPO) Carsten Fink told Xinhua News Agency in a recent interview that China's overseas patent filings have maintained a strong growth and enjoy a huge growth potential.

Carsten Fink cited a report released by WIPO last month as saying that as the same in previous years, China maintained a strong growth in overseas patent filings in 2014, topping 25,000 filings for the first time, up 18.7% year-on-year. Since 2002, China's overseas patent filings have maintained an average annual growth of approximately 30%. From 2000 to 2014, China's overseas patent filings soared from 781 to 25,525. In 2014, six Chinese enterprises became among the 50 enterprise applicants of overseas patents, doubling the number in 2013, with ZTE ranking second and Huawei Technologies ranking third. In view of the massive base of China's domestic patent filings, he believes that China has a huge potential of growth in overseas patent filings.

Data also shows that Chinese universities enjoy huge potential in overseas patent application. For example, compared to the U.S. whose universities occupied nine of the top ten places of overseas patent filing universities in 2014, China only had two universities that made into the top 50 list, with Peking University ranking 19th and China University of Mining and Technology ranking 39th. According to the definition of WIPO, intellectual property (IP) refers to creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce. IP is protected in law by, for example, patents, copyright and trademarks.

(Source: Science and Technology Daily,
April 26, 2015)