Series report of national innovation survey

National Innovation Index Report 2015

Chinese Academy of Science and Technology for Development

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Foreword

Improving indigenous innovation capability and building an innovation-oriented country is a strategic goal set forth in China's *National Program for Medium- and Long-Term Scientific and Technological Development (2006—2020)*. The Chinese Academy of Science and Technology for Development began working on the national innovation index research in 2006 in order to track and assess China's progress in building itself into an innovation-oriented country. With the support and assistance from the Ministry of Science and Technology and its related departments and bureaus, related public institutions, and experts from various sectors, the *National Innovation Index Report* has been published annually since 2011. The *National Innovation Index Report 2015* is the sixth release.

As one of the reports of the "national innovation research system" series prepared in accordance with the *Work Plan to Establish a National Innovation Research System* of the Ministry of Science and Technology, the *National Innovation Index Report* is a state-level innovation capability assessment report. In line with the overall design of the reporting framework of the national innovation research system, the *National Innovation Index Report 2015* does not include assessment of regional and enterprise innovation capabilities as in previous versions, but add the part of country analysis to provide an objective picture of the innovation characteristics of countries through indicator description and data analysis.

The *National Innovation Index Report*, which draws upon domestic and international

theories and methods of assessment of national competitiveness and innovation capability, is based on an indicator matrix comprising five pillars, i.e. innovation resources, knowledge creation, enterprise innovation, innovation performance and innovation environment. This report keeps the indicator system structure of the previous release, which consists of five first-level indicators and 30 second-level indicators. The 30 second-level indicators include 20 quantitative indicators which highlight innovation scale, quality and efficiency and international competitiveness while maintaining a balance between large and small countries, and 10 qualitative indicators which reflect the innovation environment.

This report continues to feature 40 countries with active science, technology and innovation activities (whose combined R&D expenditure accounts for 97% of the world's total), and continues to use the internationally accepted benchmarking method to calculate the national innovation index. All data are obtained from databases and publications of governments or international organizations and are internationally comparable and authoritative. The report calculates the innovation index scores of the 40 countries based on the statistical and research data of 2013—2014 and compares them with the rankings in the previous release.

In today's world, a country's property and sustainable development is mainly dependent on the development and accumulation of its national innovation capability, rather than on the number of population or availability of natural resources. As the world constantly changes, the national innovation capability of countries also changes with their ability to mobilize various elements of innovation. In the face of the opportunities and challenges from science and technology development and the changes of international political and economic situation, countries are increasing investment in resources of science, technology and innovation to strengthen their innovation capability. Against the background of global competition, China moved up to 18th position in the national innovation index rankings in 2014 with a further increased overall index score, further narrowing its gap with advanced countries.

Innovation-driven development has become China's national strategy. The establishment of the national innovation research system is set to create favorable conditions for improving the innovation assessment indicator system and advancing the capability of monitoring and assessment. It requires continuous exploration and extensive research to assess China's comprehensive innovation capability, monitor its status of national innovation capability, and analyze the gap with leading innovation-oriented countries. We sincerely hope that the annual national innovation index report willprovide an opportunity for all walks of life to understand and assess China's innovation capability development. We will continue to draw upon the valuable opinions of experts and scholars to continuously improve the national innovation index as we witness the great historical process of China becoming an innovation-oriented country.

In compiling this report, we received valuable advice and support from many experts and scholars including Lü Yongbo, Liu Yun, Sun Cheng, Li Zhengfeng, Yang Qiquan, Zhao Zheng, Guo Tiecheng and Huang Lucheng, to whom we express our sincere gratitude.

Editorial Committee of
National Innovation Index Report 2015

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National Innovation Index Report 2015

Part One:

China's Innovation Landscape through Data

I. China's Innovation Progress Reflected in Key Indicators

Since the State Council's promulgation of the *National Program for Medium-and Long-Term Scientific and Technological Development (2006—2020)*, China has attained new major achievements in science, technology and innovation as it steadily progresses from a large country to a powerful country in science and technology. China's investment in innovation resources has been steadily increasing, now ranking the second in the world in terms of R&D expenditure and the first in the number of R&D personnel. China's knowledge creation capability has improved significantly as well, ranking the second in terms of the number of internationally published scientific papers and the first and second respectively in terms of domestic invention patent applications and granted. MFP contribution to China's economic growth has increased significantly to 54.2%. China's R&D intensity has reached 2.05%, further closing the gap with innovation-oriented countries. With the robust growth of knowledge-intensive industries, China's industrial structure has been further optimized.

With the rigorous implementation of the innovation-driven development strategy, China has attained new major achievements in science and technology development as science, technology and innovation plays an increasingly vital role in supporting and driving economic and social development, accompanied by a remarkable improvement of China's science and technology competitiveness and international influence. Data about input of innovation resources, output of research activities, and development of knowledge-intensive industries show that China is making steady strides in the transition from a large country to a powerful country in science and technology and in its drive to build an innovation-oriented country.

(I) Input of Innovation Resources Steadily Increases

Innovation resources provide an important foundation for innovation activities. R&D expenditure and R&D personnel, which are at the core of innovation resources, reflect a country's investment in innovation activities and reserve of innovation talent. China's input of R&D expenditure and R&D personnel has been increasing and has provided a strong support for the country's innovation activities.

1. China Ranks the Second in R&D Expenditure

In 2014, the total R&D expenditure of the world (referring to the 40 countries covered in this study, the same below) reached USD 1.47 trillion, up 1.5% over the previous year[①], maintaining a stable growth trajectory. Geographically, the majority of total R&D expenditure is distributed in three regions — North America, Europe and Asia[②], as shown in Figure 1–1. In 2014, the three regions accounted for 33.6%, 28.9% and 32.7% of the total R&D expenditure, respectively. Compared with that in 2000, the R&D expenditure, as

① The growth rate figures in this part are given on a constant price basis.

② Asian countries: China, Japan, Korea, Singapore, India, Israel and Turkey; European countries: Austria, Belgium, The Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, The Netherlands, Norway, Poland, Portugal, Romania, Italy, Luxembourg, The Russian Federation, Slovak Republic, Slovenia, Spain, Sweden, Switzerland and the United Kingdom; North American countries: The United States, Canada and Mexico; South American countries: Argentina and Brazil; Oceanian countries: Australia and New Zealand; African country: South Africa.

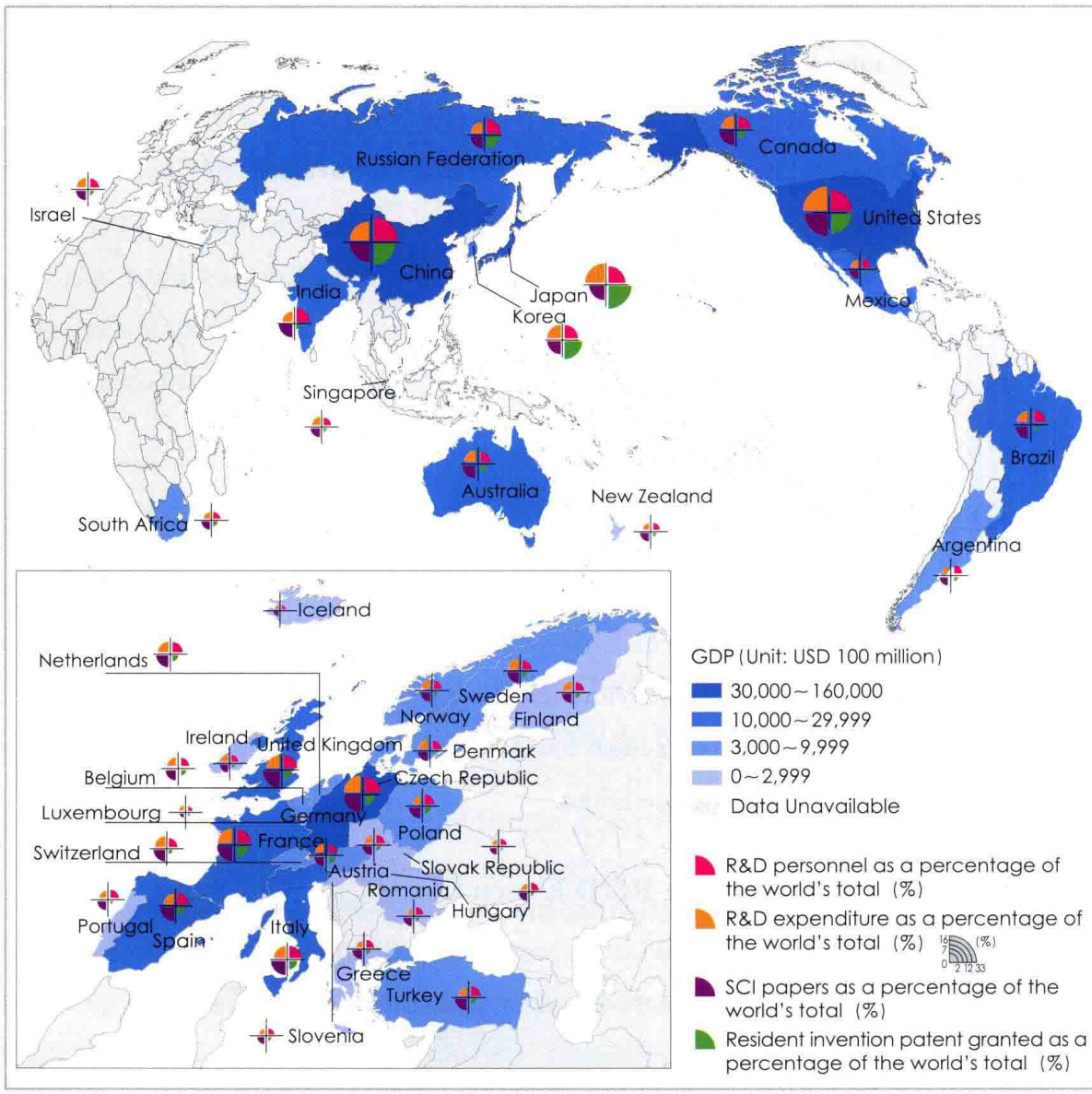

Figure 1–1 Global distribution of GDP, R&D expenditure, R&D personnel, SCI papers and resident invention patent granted(2014)

a percentage of world's total, was down 10.4 percentage points for North America, up 2.5 percentage points for Europe and up 5.5 percentage points for Asia.

The top three countries, i.e. the United States, China and Japan, remained unchanged in terms of R&D expenditure in 2014. In 2014, China's R&D expenditure reached USD 211.86 billion in the second place, with its percentage in the world total increasing substantially to

14.4% from 1.7% in 2000, further closing the gap with the United States (see Figure 1–2). In 2014, Japan's R&D expenditure reached USD 164.92 billion, or 11.2% of the world total, in the third place. The United States kept its absolute leading position in the first place, though its percentage in the world total was declining year by year, yet still well above 30%, with a clear lead over other countries, being 2.2 times that of China, and 2.8 times that of Japan.

While the global R&D expenditure remains highly concentrated in a few developed countries, the degree of concentration has been significantly lower because of the rapid rise of emerging economies and developing countries. In 2014, the R&D expenditure of G7 countries (the United States, Japan, Germany, the United Kingdom, France, Italy and Canada) accounted for 61.5% of the global total, down 21.5 percentage points from the level in 2000. On the other hand, the percentage of the R&D expenditure of BRICS countries (China, The Russian Federation, India, Brazil and South Africa) in the global total increased from 3.8% in 2000 to 19.3% in 2014.

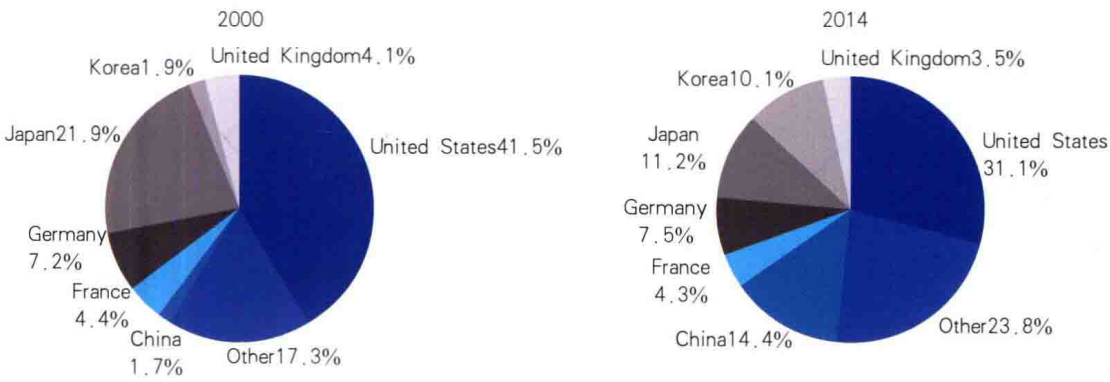

Figure 1–2 R&D expenditure of certain countries as a percentage of the world's total (2000 and 2014)

2. China Leads the World in R&D Expenditure Growth Rate

R&D expenditure of countries has been on an overall upward trajectory since the beginning of the 21st century. On a constant price basis, China had the world's highest average annual growth of R&D expenditure at 16.4% from 2000 to 2014, leading other countries by a big

margin. Korea and India also maintained an impressive average annual growth, at 9.2% and 7.8%, respectively, significantly higher than developed countries such as the United States (2.0%), Japan (2.0%) and the United Kingdom (1.6%).

Impacted by the financial crisis, the European debt crisis and other factors, Canada, Finland, Spain and Greece have slowed in R&D expenditure growth, with some even experiencing a negative growth. Countries like Japan and the United States have gone out of the financial crisis, and their R&D expenditure has returned to the upward trend as well. Judging from their performance in the recent two years, the R&D expenditure growth of countries like Korea and the United Kingdom has been steadily recovering, that of countries like Japan and India has slowed down slightly, and that of China has dropped to the lowest level in recent 15 years, though still leading other countries in this respect(see Figure 1–3).

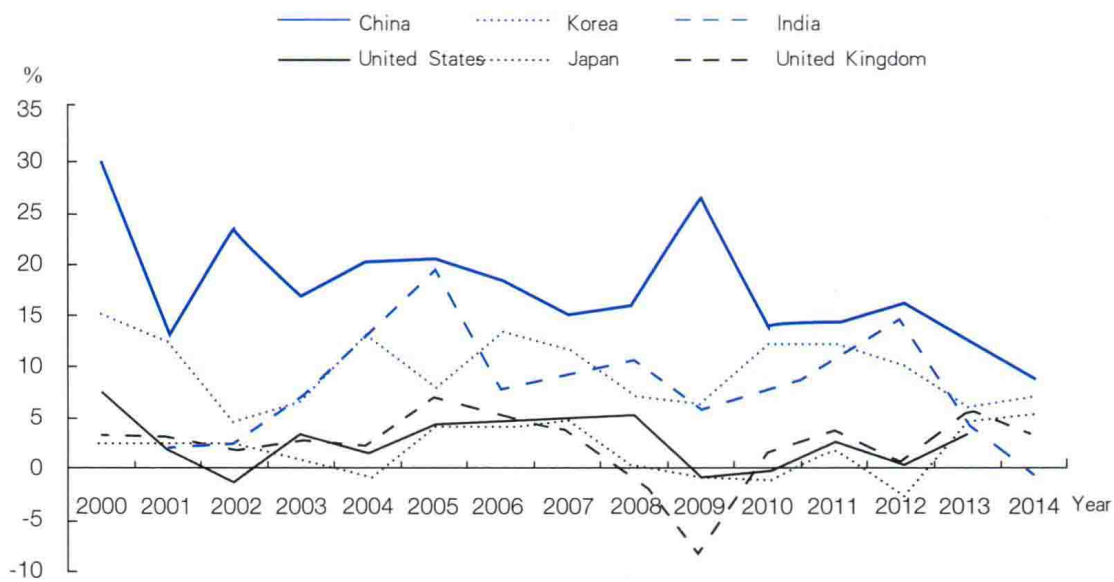

Figure 1–3 R&D expenditure growth of countries (on constant price basis)

3. China Ranks the First in R&D Personnel in Long Time

In 2014, the world's total R&D personnel reached 12.09 million in full-time equivalents

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