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- **Ministry of Science and Technology Sets Ten Major Tasks for 2014**
- **China's Investment in Research and Innovation**
- **Scientific Research in China**
- **China's International S&T Cooperation: from Seeking Dialogue to Win-win Situation**
- **2013 China-US Joint Working Group Meeting on Agricultural S&T Cooperation**

Headlines

Ministry of Science and Technology Sets Ten Major Tasks for 2014

On January 9, the 2014 National Science and Technology (S&T) Work Conference was held in Beijing. Mr. Wan Gang, Vice Chairman of the Chinese People's Political Consultative Conference (CPPCC) and Minister of Science and Technology (MOST), delivered a work report, making a comprehensive review on the work of science and technology in 2013 and announced the major tasks for development of science and technology in 2014.

Minister Wan Gang pointed out that some breakthroughs in the reform of scientific and technological management system have been made since the 18th CPC National Congress, and the science community has achieved new

Monthly-Editorial Board:Building A8 West, Liulinguan Nanli, Haidian District, Beijing 100036, China
Contact: Prof.Zhang Ning E-mail: zhangn@most.cn hixiaosun@163.com http://www.caistc.com

outcomes in carrying out the strategy of innovation-driven development, making new progress in building an innovative country. According to the minister, total R&D spending in 2013 is expected to reach 1.18 trillion yuan, 2 percent of China's GDP, among which over 76 percent is expected to come from business sector. The total number of R&D personnel (FTE) is estimated to be 3.6 million person year. The number of valid patents for invention is expected to reach 590,000, up by 24 percent year-on-year. China has kept ranking second in the number of international science papers and risen to fifth in total paper citations. The value of technological contracts in the country amounted to 746.9 billion yuan, 16 percent higher than the previous year. Basic business revenues of high-tech industries are expected to surpass 11 trillion yuan, up by 10 percent.

As Wan Gang mentioned, the relevant work in science and technology has made important contributions to ensuring steady economic and social development, especially in the following aspects: (1) the reform of scientific and technological management system has been deepened, and substantive progress has been made in implementing key reform measures; (2) greater efforts have been made to resolving major scientific and technological problems, which improves the quality of economic and social development; (3) major breakthroughs in basic research and strategic high-tech research have been made, leading to an increase of capacity for innovation; (4) policy environment for innovation has been bettered, with a good functioning of the national innovation system; (5) macro strategic studies have been enhanced, and the implementation of innovation-driven development strategy has been accelerated.

Minister Wan Gang stressed that following the work plans and guidelines mapped out by the central authorities since the 18th CPC National Congress, greater efforts should be made in the work of science and technology in 2014 to implement the strategy of innovation-driven development, focus on enhancing capability for innovation, speed up the reform of scientific and technological management system, improve the role of market mechanism in guiding technological innovation, transform the functions of the government departments, strengthen capability for managing and serving research and innovation, and make new contributions to upgrading Chinese economy and building an innovative country.

Minister Wan Gang proposed the following ten major tasks for the year 2014: (1) Enhancing top-level design for the strategy of innovation-driven development and planning for the long-term S&T development; (2) Pushing for substantive breakthroughs in key reform areas in line with the requirements of establishing a market mechanism for guiding technological innovation; (3) Advancing the implementation of S&T major projects and other priority tasks, and promoting leapfrog development in key sectors and strategic industries; (4) Improving forward-looking planning for basic research and strategic high technologies, and building up capability for original innovation; (5) Accelerating the development of modern agriculture and ensuring food security of the nation; (6) Promoting the use of livelihood-related technologies, and bringing more benefits to people through S&T innovation; (7) Enhancing regional innovation capacity to serve local economic and social development; (8) Improving the mechanism for bringing up competent professionals, and arousing the initiative of scientists and engineers in innovation; (9) Improving the policy system for science, technology and innovation, and endeavoring to create an innovation-friendly environment; (10) Strengthening international S&T cooperation, planning for and promoting research and innovation with a global vision.

In his concluding remarks, Vice Minister Wang Zhigang stressed that in implementing the strategy of innovation-driven development proposed by the central authorities, the work related to science and technology has become an important driving force at the strategic level and is playing an active role at the working level. The science community must build up a more comprehensive,

balanced and systemic view to plan and work for S&T development in light of the requirement of the Party and the State, giving full play to the role of science and technology as the primary productive force.

Over 200 delegates attended the conference, including the officials from relevant departments of the ministries and administrations, heads of the scientific institutions, associations and foundations, principal officials of the local S&T departments, and the relevant officials from MOST.

(Source: Science and Technology Daily, January 10, 2014)

Mr. Wan Gang, Vice chairman of CPPCC and Minister of Science and Technology, delivers the work report

Performance in Research and Innovation

China's Investment in Research and Innovation

According to the Statistical Bulletin of National Investment in Science and Technology (hereinafter referred to as the Bulletin) jointly released by the National Bureau of Statistics, Ministry of Science and Technology and Ministry of Finance, China's fiscal expenditure in science and technology totaled 560.01 billion yuan in 2012, more than 100 times larger than the figure of 5.289 billion yuan in 1978.

According to the Bulletin, total R&D spending in China reached 1,029 billion yuan in 2012, up by 18.5 percent compared to the previous year; the intensity of R&D spending (R&D/GDP) rose by 0.14 of a percent point to 1.98 percent. Adjusted by exchange rates, China's R&D spending ranks third in the world. In terms of R&D spending intensity, China is in a leading position among emerging countries, and narrowing its gap with the developed countries.

In recent years, the national financial spending on basic research has grown at a faster rate than the total funding for science and technology. In 2012, the central finance allocated 32.8 billion yuan to support basic research, among which 17 billion yuan went to the National Natural Science Foundation, 4 billion yuan to National Basic Research Program (the 973 Program) and 1.84 billion to "Innovation 2020" project of the Chinese Academy of Science (CAS).

In 2012, the business sector spent about 784 billion yuan on R&D, 19.2 percent higher than the previous year, accounting for 76.2 percent of total R&D spending in China.

Over the past 35 years since the launch of reform and opening-up, China's expenditure on S&T has kept increasing rapidly, and relevant regulations and management have improved constantly. All these provided strong support for research and innovation of the whole society.

(Source: Science and Technology Daily, December 10, 2013)

S&T Human Resources and Talent Development Policies

Over the 35 years since reform and opening-up, China's S&T human resources has maintained steady growth. In 2012, the number of S&T professionals holding a bachelor's degree or above totaled 69.6 million, ranking first in the world for six consecutive years. According to statistics, the number of R&D personnel (full-time equivalent) totaled 3.24 million in 2012. It is estimated that if the 10 percent growth rate can be sustained, the number of China's S&T professionals will surpass 100 million in 2015 and reach 160 million in 2020. China's S&T talent development policies have created favorable conditions for giving full play to the role of human resources.

At the National Science Conference in March 1978, former leader Deng Xiaoping pointed out in explicit terms that "intellectuals are part and parcel of China's working class", which ushered national policy for S&T talent into a new stage of development.

In 1985, the Decision on the Reform of the Scientific and Technological Management System was promulgated. Specific rules were established for promoting mobility of S&T professionals, experimenting with new measures to improve recruitment and appointment, and allowing part-time work under certain conditions in order to encourage S&T professionals to play a bigger role in driving economic growth.

Since 1990s, a series of favorable policies have been carried out for facilitating mobility of S&T professionals. In 1994, the Chinese Academy of Sciences (CAS) initiated the "Hundred Talents Program" to attract and cultivate talented young professionals at home and abroad. In 1998, the Ministry of Education launched the "Changjiang (Yangtze River) Scholar Program" to award outstanding young and middle-aged scholars. In 2008, the implementation of the "Thousand Talents Program" enabled more high-caliber overseas professionals come to leading position of scientific research in Chinese universities, research institutes and industrial development zones.

At policy level, China published in 2002 the first comprehensive national plan for human resource development. In 2003, the CPC Central Committee and the State Council put forward the strategy of building a strong nation through human resource development.

In November 2012, the 18th CPC National Congress proposed the strategy of innovation-driven development. The new leadership has repeatedly stressed on many occasions that in order to carry out the strategy of innovation-driven development, further efforts should be made to improve the system of human resource development, train and cultivate more talent, develop a sound mechanism for growing and attracting talented personnel, promote mobility of S&T personnel, and give full play to the role of high-caliber professionals in research and innovation.

Creating a sound environment for bringing up innovative talents, training and cultivating a large number of high-caliber S&T workforce are the focal points of China's national policies for S&T human resources in the new era.

(Source: Science and Technology Daily, December 24, 2013)

Scientific Research in China

In September 2013, the Institute of Scientific and Technical Information of China published the results of its statistical analysis on China's science papers over a ten-year period, which showed the following features:

1. China's international science papers increase in both quantity and quality

According to statistics, from 2003 to September 2013, Chinese scientists and engineers published a total of 114.3

million science papers on international journals, ranking second in the world, up by 11.8 percent compared with previous statistics. The Chinese papers were cited 7.09 million times on international publications, which lifted China's position in the citation rankings to the fifth from sixth in the previous year, meeting in advance the target set in the *12th Five-year Plan for Scientific and Technological Development*. On a per unit basis, each Chinese paper was cited 6.92 times on average, which was a significant improvement over the previous year. Currently, the world average of single paper citation is 10.69 times.

2. China shows great research potential in chemistry and other four scientific disciplines

China is among the world's top ten countries for international paper citations in 15 scientific disciplines. The country ranks second in the five disciplines: chemistry, material sciences, engineering technologies, mathematics and computer sciences, and third in agricultural sciences and physics.

Take chemistry as an example: in the past ten years, the papers published by Chinese scientists accounted for 18.83 percent of the world's total in aggregate terms, and 13.51 percent in the number of citations. Comparatively speaking, these five disciplines have shown the research potential of Chinese scientists.

3. The number of papers with "good performance" increases

If "good performance" refers to papers with higher-than-world-average citations, then among the 164,700 papers published in 2012 with Chinese scientists as the first author, 43,500 papers have made "good performance", accounting for 26.4 percent of the world's total, up by 1.4 percent over the year 2011.

In addition, the number of Chinese papers with high citation rate, which accounts for the world's top 1 percent citations, has also risen by 20.3 percent to 9,524, ranking fourth in the world, one position higher than 2012. In this regard, the United States ranks first, producing 59,970 highly cited papers in 2012, 54.1 percent of the world's total. The United Kingdom and Germany come the second and third in the list.

(Source: Science and Technology Daily, September 28, 2013)

Every 10,000 Chinese Own 4 Invention Patents

According to the State Intellectual Property Office (SIPO), the number of domestic and foreign invention patents granted and kept effective by the SIPO totaled 1.034 million by the end of 2013, an increase of 18.2 percent over a year earlier, among which domestic invention patents amounted to 587,000 (including 42,000 invention patents from Hong Kong, Macao, and Taiwan), accounting for 56.8 percent of the total and up by 24.1 percent year-on-year. Based on the figures, every 10,000 Chinese own 4 pieces of invention patents (excluding Hong Kong, Macao and Taiwan), 0.7 of a piece higher than the goal of 3.3 pieces set forth in China's 12th Five-Year Plan.

Among the valid domestic invention patents, companies held 352,000 invention patents, up by 28.5 percent from a year earlier, accounting for 60 percent of the total, 2 percent higher than that by the end of 2012; Universities held 116,000 invention patents, an increase of 19.6 percent from a year earlier, accounting for 19.8 percent of the total; Research institutes held 47,000 invention patents, an increase of 27 percent from a year earlier, accounting for 8 percent of the total.

The top five areas (excluding Hong Kong, Macao and Taiwan) with the largest number of valid domestic invention patents are Guangdong (95,000), Beijing (85,000), Jiangsu (62,000), Shanghai (48,000), and Zhejiang (43,000).

(Source: China High-Tech Industry Herald, January 20, 2014)

China's International S&T Cooperation: from Seeking Dialogue to Win-win Situation

Over the past 20 years, more and more Chinese scientists have taken part in the research of international mega-science projects, such as the Human Genome Project, Galileo Project, ITER Project and Daya Bay Reactor Neutrino Experiment, which shows the transition of China's international S&T cooperation, from seeking dialogues to win-win situation.

International S&T cooperation has been part and parcel of China's S&T policies since reform and opening-up. In 2000, China published its first national Outline for international S&T cooperation during the 12th Five-year Plan Period. In 2001, MOST launched the *International S&T Cooperation Program of China* and stepped up its support for international cooperation and exchanges. The funding for international S&T cooperation has soared to 1.8 billion yuan in just ten years.

Since its reform and opening-up, China has shifted the focus of its international S&T cooperation from seeking dialogues to win-win situation, which is demonstrated not only by its participation in international mega- science projects, but also by the elevated level and quality of inter-governmental S&T cooperation and the substantial progress in bilateral and multilateral cooperation.

Today, science, technology and innovation have already become major agenda items in China's bilateral relations with the United States, Russia, Europe and other countries. The Daya Bay Reactor Neutrino Experiment and the research of the superconductor magnet components used in the Alpha Magnetic Spectrometer are the leading examples among the thousands of S&T cooperation projects between China and the US; the EU has spent over 15 million euros in its special research program for China's SARS epidemic, which played an important role in control of the infectious disease…

From 1978 to 1993, China has joined 850 international scientific and technological organizations. By the end of 2011, China had become the member of over 1,000 international institutions and cooperative organizations in science and technology, and more than 200 Chinese scientists are now holding leading positions in 350 organizations of this kind. In 2012, over 46,700 articles produced by Chinese scholars through international cooperation were included in SCI journals.

International S&T cooperation has boosted China's overall strength in science and technology, stimulated industrial upgrading, and encouraged lots of technology-based companies to go global.

China seeks promoting science, technology and innovation by opening to the outside world, and realizes win-win outcomes through cooperation. After 35 years of consistent work, China is now conducting international S&T cooperation featuring diverse forms, multiple areas and better research performance.

(Source: Science and Technology Daily, January 2, 2014)

2013 China-US Joint Working Group Meeting on Agricultural S&T Cooperation

From August 19 to 20, 2013, the 11th joint working group meeting for China-US agricultural S&T cooperation co-chaired by the Ministry of Science and Technology of China (MOST) and the Department of Agriculture of the United States (USDA) was held in Fort Collins, Colorado, USA. Dr. Zhang Laiwu, Vice Minister of Science and Technology, and Dr. Catherine Woteki, Under Secretary of the US Department of Agriculture, attended and addressed the meeting. More than 30 delegates attended the meeting, including officials from MOST and USDA as well as leading experts in seven priority areas and flagship projects for China-US agricultural S&T cooperation.

During the meeting, representatives of the two countries reported the outcomes of China-US cooperation in the implementation of the 12 annexes of the Protocol between MOST and USDA on Agricultural S&T Cooperation (hereinafter referred to as the Protocol) and the research progress made in the three priority areas of the China-US flagship agricultural projects. Experts of both sides conducted extensive discussions on ways to expand areas of cooperation through the adjustment of the Protocol's objectives. The meeting concluded with a tentative decision to hold the 12th joint working group meeting next year in Yinchuan, Ningxia Autonomous Region of China. At the closing ceremony of the meeting, Vice Minister Zhang Laiwu and Under Secretary Woteki signed an extension document for annex 7, which renewed China-US cooperation on bio-energy by a period of five years.

After the meeting, USDA organized a site visit for the experts to the animal/plant genetic resource conservation and germplasm conservation projects of the USDA Agricultural Research Service, where they received an update on the status of research and advanced technologies of the United States in the conservation of animal/plant genes and species.

Agricultural S&T cooperation has always been a priority area in the framework of China-US cooperation in science and technology. In particular, since the Protocol was signed in 2002, agricultural S&T cooperation between the two countries has delivered notable results: seven priority areas of cooperation have been established, which include natural resource management, agricultural bio-technologies, agricultural water-conservation technologies, agricultural produce processing, food safety, dairy production and processing and bio-fuels development; nine joint research centers have been established and a group of talented agricultural professionals have been generated; scientific R&D has been advanced in several important areas, and a number of cooperation outcomes have been put into applications.

In 2012, the Protocol was signed by MOST and USDA on Flagship Agricultural Cooperation Projects, which identified three priority areas for flagship project cooperation, i.e. agricultural bio-technologies, water-conservation technologies, and gene pool collection technologies and measures. With the implementation of the flagship projects, there will be a deepened agricultural cooperation and exchanges between China and the US, which paves the way for new breakthroughs in bilateral relations between the two countries.

1st China-US Joint Experiment on "Man-made Sun" Attains Success

The first joint experiment with a special device EAST, China's new-generation energy facilities of the so-called "man-made Sun" developed by the Hefei Institute of Physical Science, Chinese Academy of Sciences (CASHIPS), and the Tokamak device of the US company

General Atomics, DIII-D, was successfully conducted in September 2013. The experiment proved the feasibility of high-performance and stable operation of Tokamak.

By simulating the experiment conditions of EAST, making use of the off-axis heating and current drive capability of DIII-D for the production of a special type of plasma, and studying the relevant physical issues with the physical diagnosis and analysis tools provided by DIII-D, the experiments endeavored to establish an advanced operation model for producing high-parameter, fully-stable plasma with EAST.

Achieving high-performance, stable operation of Tokamak is one of the objectives of the ITER Project. EAST, a superconducting Tokamak device, is designed for the purpose of rehearsing the stable operation of ITER. In the next round of the experiment, the heating power of the device will be lifted beyond 20 MW.

By collaboration with General Atomics, the scientists of CASHIPS conducted a simulation of the experimental conditions of EAST on the DIII-D device, and successfully produced the high-performance plasma under designated conditions.

China is one of the participants in the ITER Project. EAST is the world's first fully superconducting nuclear fusion experimental device independently designed and manufactured by Chinese professionals. It passed the acceptance check of the state in March 2007, and has produced a number of research outcomes over recent years. The facilities are most likely to lay a solid scientific and technological foundation for the ITER Project and China's design, construction and operation of nuclear fusion reactors in the future.

(Source: Science and Technology Daily, September12, 2013)

China-US Scientific Innovation Park Located in Hebei

On September 17, 2013, the signing ceremony of the China-US Scientific Innovation Park was held in Baoding, Hebei province. Mr. Xu Ning, Deputy Governor of Hebei Province, officials with the provincial department of science and technology and the municipal government of Baoding, Mr. Tom Darden, President of the Cherokee Fund, and officials with the Ministry of Science and Technology attended the ceremony.

According to the Chinese and US chief directors of the project, the scientific innovation park has chosen Baoding for its sound environment and strong industrial foundation. It aims to combine the US experience in the operation of the North Carolina Science Park with Baoding's human resources and ecological advantages to build a future-oriented platform for the development of new industries. The two sides hope to deepen cooperation in new energy development and the building of high-tech industrial parks.

The North Carolina Science Park is a well-known science park in the US. Attracted by the friendly education and research environment of the three neighboring universities, i.e. Duke University, University of North Carolina and North Carolina State University, many Fortune 500 companies, including IBM, Cisco and Bayer, have set up R&D centers in the park. Currently, there are over 170 companies in the park, conducting research in areas ranging from life science, information technologies to financial services. The agreement signed by the two countries this time covers a number of cooperation projects, including CODA electric vehicles, nickel reactor and new fire-proof materials.

China and US Jointly Develop New Drugs

Major progress has been made in the three tumor-targeting new drug research projects undertaken by the Chinese company Sincere, including "recombinant human monoclonal antibody in rabbits". By conducting joint research with several US SMEs for new drug development, Sincere has built the first technological platform in China for human monoclonal antibody in rabbits, and developed the first "anti-VEGF human monoclonal antibody for injection purposes" (SIM63) in the world. This joint research initiative has received the CFDA approval for clinical test, and is expected to make into the new list of candidate drugs.

(Source: Ministry of Science and Technology, November 22, 2013)

China-US Researchers Locate Pain-suppressing Ingredient in a Traditional Chinese Medicine

Chinese and American scientists announced on January 3 that they had discovered and confirmed a new pain-suppressing active ingredient in *corydalis tuber,* a traditional Chinese medicine (TCM) also known as yan hu suo, which could provide the basis for the development of pain killers with weak side effects and no addiction.

corydalis tuber is a traditional Chinese herb grown mainly in Zhejiang and Jiangsu province of China, which has been used as an efficient pain killer in traditional Chinese medicine for over 1,000 years. The dry tuber of the herb can be used for medical purposes.

The scientists of the Dalian Institute of Chemical Physics of the Chinese Academy of Sciences and the University of California, Irvine jointly discovered this pain-suppressing active ingredient, DHCB, in *corydalis tuber,* which works pretty well in treating chronic pains and with no drug resistance.

According to the head of the Chinese research team, side effects such as addiction and drug resistance have significantly constrained the clinical use of morphine and other pain killers. DHCB works very differently from opioid drugs in easing pains. Instead of stimulating opioid receptors, it produces its effect by stimulating the antagonist of dopamine D2, therefore offering a new possibility for pain treatment.

The researchers say they are planning to conduct a toxicological test on DHCB in the next stage, because although the natural ingredient has been in use for over 1,000 years, it may still contain hidden toxicity.

The findings of this research will be published in the next issue of the US journal – *Contemporary Biology.*

(Source: Science and Technology Daily, January 5, 2014)

(Editor's Note: All news in the issue are translated from Chinese texts for your reference. They are subject to checks and changes against official release of original Chinese or English texts.)