The Role of Chinese Science and Technology in Economic Development

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China is a country of great contrasts. It has an enormous population yet a relative dearth of natural resources per capita. It has a very long history and rich culture yet suffers from an underdeveloped economy and an uneven educational system. It covers a vast territory yet the level of development varies greatly from region to region. These factors play a critical role in determining not only the scale and rate of growth of Chinese science and technology but also the ideology that shapes its development.

The foremost goal of scientific work is to further economic development. This course is followed not just in China, but also in developing countries around the world. As early as 1956, the Chinese government formulated a 12-year plan for scientific and technological development. After 1978, following the initiation of the reform and open policy for China, the government organized and carried out a series of major activities, including the National Scientific and Technological Key Problem-Tackling Plan, the Spark Plan, the High-Tech Research and Development Plan (often called the 863 Plan), the Torch Plan, the Key Scientific and Technological Achievement-Popularizing Plan, and the Climbing Plan. In 1985 it created the National Natural Science Foundation of China.

These scientific and technological plans are part of a broader strategy for Chinese science intended to build up the economy, develop high technology, and strengthen fundamental research. They also have played an important role in raising the level of Chinese scientific and technological achievement and promoting the conversion of scientific achievements into practical applications.

Major Accomplishments

In the past 45 years, China's scientific and technological enterprise has grown rapidly and attracted worldwide attention. A relatively complete range of disciplines has been formed in a number of major scientific fields, and new areas such as molecular biology, surface physics and chemistry, high-temperature superconductivity, mine formation theory, supercrystal lattice, and quasi-crystal physics have experienced rapid growth. China has successfully constructed more than 10 significant scientific projects, among them the Beijing Electron-Positron Collider, and identified about 150 State Key Laboratories. In addition to laying down the foundation for modern technologies such as atomic energy, aviation and space flight, and information, these efforts have provided a mechanism for training large numbers of scientists. Through such accomplishments, the country has basically solved the problem of providing for its 1.2 billion people, who make up 23% of the world's population, on only 7% of the Earth's cultivable land.

At the same time, modern scientific and technological developments extend across national boundaries and connect with a global system. China's scientists have absorbed knowledge and acquired energy from this sea of international science and technology even as they have spread their own knowledge and released their own energy into it, thus speeding up the pace of development. Their participation in international scientific and technological programs, especially in topics of worldwide interest such as the International Earth Biosphere Plan and the World Weather Research Plan, has met the twin goals of sharing knowledge and saving money, as well as strengthening the ability of Chinese researchers to carry out their work. As a result, China has actively supported participation in international conferences and cooperative research.

But modern Chinese science has had a relatively short time to develop compared with the rest of the world, and the country's investment in science and technology—0.6% of its gross domestic product (GDP)—is still several times lower than the world's industrialized nations. The result is a large gap between the overall level of science and technology in China and the developed countries. In addition, basic and high-tech research achievements in China have not yet played a major and direct role in the development of her own high-tech industry.

Chinese science and technology faces two major challenges. The first is how to help solve a number of major strategic problems, including adequate levels of food, shelter, transportation, education, and health care. The problems are aggravated by the country's relative lack of natural resources and the need to protect its environment in the face of rapid growth.

The second challenge involves improving the country's scientific and technological infrastructure. The standard of research, especially for creative work, must be raised. The lack of investment in science and technology seriously impedes the development of Chinese science and technology. Although the government's investment in science and technology has been increasing each year because of rapid economic growth, this increase is far from rapid enough when seen against the actual needs. A shortage of funds has made it difficult to renew scientific instruments and equipment.

Greater R&D Spending

On the eve of the new century, China is now actively adjusting her scientific and technological strategy, speeding up scientific and technological progress, and tying national economic development more closely to scientific and technological advancement and to the quality of the work force. To achieve these goals, scientific and technological investment will be increased through many channels and at various levels, with a goal of having R&D spending reach 1.5% of GNP by the year 2000. Following a trend around the world, this growth will be carried out under the principles of targeting a few important areas, concentrating power, tackling key problems, and blazing new trails.

Within the field of fundamental research, the emphasis will be on the development of newly emerging leading disciplines, along with creative and pioneering work. In the high-tech field, the focus will be on those areas of strategic importance to the national economy that are also likely to create jobs. Major yardsticks include improved technical skills, a mastery of intellectual property rights, and improved economic competitiveness. These trends are expected to speed up the pace of the commercialization and industrialization of high technology.

Scientists in China have been asked to carry out a mission that may be unprecedented in world history. On the one hand, they must contribute to the prosperity of science and culture. On the other hand, they must work hard for the lives and healthy growth of the Chinese people. I firmly believe China, as an ancient civilization that has made many brilliant contributions to world science, will inevitably make even more contributions to global well-being by sticking to the thesis that science and technology is the first productive force.

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