

# **Torch Program – Birthed in Texas, Grown Up in China, Returning to Texas/Mexico: An Entrepreneurship Creation Program for the Success of Chinese High Tech Industry**

By Dinghuan Shi and Ted Y. Li

## **Abstract**

*China initiated a nation wide innovation program – called Torch in developing its high tech and new tech industries in 1988. As of today, the Torch Program has made great success in China. There are 53 national Science & Technology Industrial Parks (STIPS) which generated over 3.5 Million jobs and \$200 Billion USD in 2003 (18% of the Chinese GDP that year). 465 technology incubators are actively running for sustainable development. There has been a myth puzzled so many people in the U.S. and Mexico by the fact that China developed its economy with such a high growth rate. One of the key secrets which made such an economic miracle is the entrepreneurship created by three initiatives of the Torch Mission: to build new and high tech industries by implementing commercialization, industrialization and internationalization programs for technology innovation. It is rare to know that implementation plan of such great program was birthed in Texas. The pilot program was developed from business incubator model created by Dr. George Kozmetsky at IC2 of University of Texas. Omega International Group, Inc., a Texas based corporation, bridged such transformation from Texas to China.*

## **I. Overview of National Programs for Science and Technology In China**

There are myths about how China achieved its economic miracle over last two decades. This article provides facts. Innovation with entrepreneurship creation is one of the key factors for such a great success. Beginning in the 1980s, China formulated a series of general programs for scientific and technological research and development, aiming at improving China's competitiveness in science and technology in the 21<sup>st</sup> century. The Key Technologies R&D Program, 863 Program and 973 Program have formed the main body of the national programs for science and technology development. The Spark Program and Torch Program have also made great contribution to the high growth of Chinese economy.

### **Key Technologies R&D Program**

The Key Technologies R&D Program was launched in 1982 as the largest science and technology program in China in the 20<sup>th</sup> century. Oriented toward national economic construction, it aims at solving the key and comprehensive problems directing the national economic and social development, covering agriculture, electronic information, energy resources, transportation, materials, resources exploration, environmental protection, medical and health care, and other fields. This program, engaging tens of thousands of professionals from more than 1,000 scientific research institutions nationwide, has been, so far, the largest national

scientific and technological plan, investing funds, employing personnel, and making the greatest impact on the Chinese national economy.

**863 Program.** *In March 1986, after several hundred Chinese scientists made a thorough study, the National Hi-tech R&D Program (aka. 863 Program) was launched. The program includes 20 themes, such as biotech, space flight, information, laser, automation, energy, new material and marine. In the operation of the program, the main functions of the government departments are macro-control and service. The general direction of research is decided by scientists after discussion, and specific projects are decided by a committee of experts, whose responsibility is to closely observe the latest development of the international scientific research, and submit an annual report on investigations in their own fields, so as to set new research directions. Another distinctive feature of the program is that its results can be quickly used for industrial applications.*

**973 Program.** *A national key program for development of fundamental scientific research, the 973 Program, was implemented in 1998. It mainly involves multi-discipline, comprehensive research on important scientific issues in such fields as agriculture, energy, information, environment of resources, population and health, and material, providing a theoretical basis and scientific foundation for solving problems. The program encourages outstanding scientists to carry out key basic scientific research regarding cutting-edge sciences and important issues in science and technology in fields with great bearing on economic and social development. Representing the national goals, it is aimed to provide strong scientific and technological support for significant issues in China's economic and social development in the 21st century.*

**Spark Program.** *Launched in 1986, the Spark Program aims at revitalizing rural economy through science and technology and to popularize science and technology in rural areas for village farmers. Today, there are more than 100,000 scientific and technological demonstration projects being carried out in 85 percent of rural areas throughout China. Numerous success stories reveal how a farmer can drive a Mercedes today after working at the rice field yesterday through the help of this program.*

**Torch Program.** *The State Council approved a national program designed to develop new and high technology industries in China in August 1988. The Ministry of Science and Technology (MOST – formerly called State Science and Technology Commission) has been responsible for the program implementation. It is viewed as one important component of the national strategy “Revitalizing the country through Science and Education”. Keeping in line with the general policy of reform and opening up to the outside world and with a view of bringing into full play the potential and advantages of China's scientific and technological capabilities, the program promotes commercialization, industrialization and internationalization of new and high technology research results in conformity with the laws of market economy.*

## ***II. Texan Story – Evolution Process of Torch Program Implementation***

In 1988, the State Science & Technology Commission of China {(SSTCC), predecessor of Ministry of Science & Technology (MOST) today} made resolution to develop its national new tech and high tech development program, code named Torch Program. The main objectives of the Torch Program focused on the commercialization, industrialization and internationalization of R& D by small/medium sized enterprises. Counselor Dinghuan Shi was appointed as the first Executive Director of Torch Development Center to draw the blue print to implement the Torch Program.

Begun in 1989, SSTCC hired OMEGA to study different business models and programs including business incubators, SBA loans and other government assistance programs in the U.S. to seek solutions to implement the Torch Program. Later OMEGA organized case study trips for SSTCC's core team to the U.S. from the west coast to the east coast. Through assistance from Mr. Skipper Dippel and Dr. Ray Perryman, the State of Texas was the focal point of the their study. The Business Incubator of IC2 of UT Austin and Dr. George Kozmetsky and the Austin – San Antonio High Tech Development Corridor Council presented Mr. Shi and his team real cases for commercialization and globalization of technical innovation. One of the main tasks contracted to OMEGA was to develop implementation plans to execute the Torch Program. Since 1990, many Chinese delegations have made their business missions to the State of Texas. To name a few sponsors, City of Houston, City of Dallas, City of San Antonio, City of Austin, Greater Houston Partnership, San Antonio Economic Development Foundation, Washington County Chamber of Commerce, Bexar County Economic Development Office made significant contributions in hosting numerous Chinese companies for culture exchange and economic cooperation programs. In 1993, Omega, contracted by SSTCC to organize a US – China – Mexico Tech Expo in the City of San Antonio. Over 150 Chinese high tech and new tech companies participated the expo.

As of today, the Torch Program has had great success in China. There are 53 National Science & Technology Industrial Parks (STIPS), which generated over 3.5 Million jobs and \$200 Billion in 2003 (18% of the Chinese GDP that year). Fully 465 business incubators are active, with sustainable development.

## ***III Measures of Torch Program Implementation – Birthed in Texas, Grown Up In China***

### ***Mission of the Torch Center***

Torch Center was created as the implementation entity under MOST for the Torch Program. The mission of the center was designed

1. To study the development status and problems in the industrialization of new and high technology as well as STIPS in China, and make policy recommendations for decision-making by the MOST;
2. To formulate a macro development plan, policy recommendations, and administrative guidelines for the Torch Program and overall administration of STIPS, development consultancies and other services;
3. To facilitate commercialization, industrialization and internationalization of hi-tech R&D achievements;
4. To draw up development plans and policy recommendations for technology incubator centers and to review and approve national technology incubators and overseas scholar innovation parks;
5. To manage and operate the Innovation Fund for Small/Medium Technology – Based Firms.
6. To make policy recommendations on financing and investment in high and new technology industrialization and facilitate the development of venture capital investment in science and technology;
7. To be responsible for software industrialization and other development bases for industrialization from the Torch Program;
8. To collect and analyze statistics pertaining to STIPS and industrialization of high and new-technology and organize the compilation of new and high technology products and export catalogues;

### Main Initiatives of the Torch Program

#### *1. Create a Proper Environment for the Development of High Tech Industries.*

Torch formulated medium to long-term plans and complete sets of policies, laws and regulations for the development of new/high tech industries; created sound supporting environments and established the managerial operational systems for the development of new/high tech industries; opened up financing sources and built up risk investment mechanisms; and opened up domestic and overseas information channels and established information networks.

#### *2. Establish High Tech Industrial Development Zones and Technology Incubator Centers*

**Science & Technology Industrial Parks (STIPS).** The establishment and development of STIPS is one of the key initiatives of the Torch Program and an inevitable outcome of reform, opening to the outside world and the social development of a market economy. STIPS are based on intensive knowledge capital and a business friendly environment. They are concentrated zones established for purposes of transforming R & D achievements of science and technology into commercial application through optimizing soft and hard environments, targeting both domestic and overseas markets and developing China's high tech industries.

Other functions of STIPS include: *experimental zones* and *demonstration zones* for close integration of science and technology with the economy, and promotion of

business transformation of achievements by scientific and technological innovation; creation of new urban development models; and creation of schools for training and nurturing high technology industrialist.

**Technology Incubator Centers.** The incubator centers are localized based on business model in the U.S. One stop service under one roof with shared corporate service infrastructure and other facilities for start up operations. Incentives such as seed funds or zero rent are provided to support those start up companies.

Technology incubator centers act as technology service institutions for the public interest by drawing on the experience of Texas business incubators. The main objectives of those incubators are to facilitate technology transfer, nurture high-tech based companies and entrepreneurs, and provide new start-ups with necessary services they need in their early stage of development so as to ensure the high-tech based companies a high rate of growth.

Technology incubators have become the base for commercialization of high technology achievement; a school to nurture tech-based companies and entrepreneurs; the core of a technology innovation incubating system; and a major component in the supporting framework of high technology industries.

### *3. Torch Program Project Award*

The Torch Program Project Award is given to exemplary projects that demonstrate the missions of the Torch Program. Targeting both domestic and international markets, Torch Program Project Awards are given to those that are advanced in technology with good market potential and a high rate of return. Torch Program Project Awards are made in the fields of electronics and information technology, biotechnology and new medicines, new materials and their application, mechatronics, new energy, high-efficiency energy conservation technology and environment protection technology.

### Current Operations of Torch

Since 1996 when the 9th national development five-year plan of China commenced, several measures have been taken to support the development of Torch Program Project:

**Evaluation and Approval of National Torch Program Project Award.** Worth projects are awarded based on the requirements of possessing its own intellectual property rights or know-how, being technological leader in its related industry domestically, and in the preferred category of a high-tech industry as being of national priority yet being a driving force in local economic development.

**Evaluation and Approval of Key High-Tech Industrial Enterprises.** Each year, some key high-tech enterprises or groups are selected from those enterprises that carry out Torch Program projects. In order to accelerate local economic development, central and local governments will join efforts to support these

selected key high-tech enterprises in marketing, information distribution, financing, management and services.

**Identification of Torch Program High-Tech Industrial Base.** The Torch Program high-tech industrial base refers to high-tech industrial enterprise clusters that are established in a concentrated location with favorable environment to develop preferred category of the industries by Torch Program. The clusters are technology intensive with distinctive industrial features and will play a role of industrial demonstration for technology in respective industries and better manifest their support and contribution to local economic growth.

**Establishment of Software Industry Base.** To push forward the scale and international business operation of software industry in China, in reliance on support from local government and science and technology industrial parks, MOST has made efforts to establish software industry base since 1995. By concentrating the local advantages in software industry and creating a favorable policy environment as well as good working and living conditions, the software industry initiative facilitates technological innovation, product development, start-up nurturing, personnel training and foreign exchange earning through product exporting. The software industry bases established include the Northeast University Software Park and 21 others across the country, which have all grown rapidly and become the mainstay for the national software industry.

**Innovation Fund for Small & Medium Sized Firms with Technology Innovation (Innofund).** Innofund is a government venture capital source funded by the State Council of China and administrated by MOST through project grants, interest-subsidized loans, and equity investments. Innofund is aimed at supporting technology innovation activities for small to medium sized firms with emerging technology, facilitating transfer of R & D achievements, nurturing a group of small technology-based firms and expediting the industrialization of new and high technology industry.

As a venture fund from the central government, Innofund is operated in accordance with the laws of a market economy. It supports small technology-based firms regardless of their type of ownership; induces investment from local governments, enterprises, venture capital firms and financial institutions to invest in small technology-based firms, optimizes technology investment resources and creates an environment conducive to innovation and development of small technology-based firms.

**International Business Operation of New and High Tech Industry.** It is one of the missions of the Torch Program to strengthen the international cooperation and to bring the new and high technology industry onto the track of globalization. Torch has developed extensive cooperative relations with various countries and regions around the world on the basis of equality and mutual-benefit, and through various governmental and nongovernmental links as well as establishment of such institutions as APEC Science & Technology Industrial Parks, International Business Incubators and Overseas Science & Technology Parks in U.S, Russia

and Singapore, in an attempt to develop exchange and cooperation in multi-forms with scientific/technological, financial, industrial, and commercial communities abroad, so as to help China's new and high technology products to enter into the international market and the new and high technology industry to operate internationally.

**Personal Training.** Human resource development is critical for the growth of new and high technology. To bring up and attract qualified personnel is a fundamental guarantee for the realization of commercialization, industrialization and internationalization of new and high technology achievements. It is one of the major missions of CTP to bring up a batch of managerial personnel and entrepreneurs for science and technology development who have good technological training, the skill of management and business operation, boldness in innovation, and the courage to struggle hard in market competition.

#### ***IV Lessons Learned for the Last 18 Years Implementation of Torch Program***

Reviewing the development process of the 18 years of Torch Program, the remarkable achievements it has made can be attributed mainly to the experiences in the following aspects:

##### ***1. Government's Main Function Should be Focused on Creating a Business-Friendly Environment for the Sustainable Development of High Tech Industry***

In the transitional course of China from a planned economy to a market economy, there are still many aspects that have not yet been adapted to the requirements of the industrialization of new and high technologies, including market conditions, the legal environment, infrastructures, the consciousness of innovation, the social and cultural atmosphere and so on. Therefore, it is very important to fully exercise the government's function of macro control and guidance in creating an optimized, comprehensive environment concentrated with the necessary requisites for industrialization. STIPS is a successful mechanism for such a development.

##### ***2. Innovation with Sustainable Development is the Key to the Success of Torch Program***

One of the main characteristics of new and high technology development is the rapid renovation of technology, which requires a sustained innovation capability. Through the implementation of the National Program on Key Fundamental Research Projects (973 Program), the National High-tech R&D Program (863 Program) and the Key Technologies R&D Program, MOST has provided abundant sources of technology innovation for the Torch Program. Synergy creation by government agencies, business communities, universities, research institutions and financial institutions played important roles for the success of Torch.

### *3. Entrepreneurship Creation with Consideration of Domestic and International Market is the Essence of Torch Program*

Through the development of STIPS, the Torch Program created hundreds of thousands of entrepreneurs and private companies, which are targeting domestic and international markets. Globalization with innovation has been always the focus by every aspects of Torch Program from day one of its implementation.

### *4. Small to Medium Sized Companies are the Driving Force for the Development of Torch Program*

Small and medium-sized enterprises not only sustain the national economy but also absorb a majority of the employment. The technology-based small to medium sized companies, which boost the capability for innovation and rapid market response, are furthermore the cradles for the large high-tech enterprises. In China, private business, not state owned enterprises, has been the driving force for the success of Chinese economy.

## ***V. Go Global Program from China to Texas–Mexico***

With the remarkable success of the Torch Program over the last 18 years, China is poised to participate in global economic cooperation to continue its growth. Go Global Program is an initiative of MOFCOM and sponsored by MOST to assist Chinese companies for their global business expansion overseas in the era of post WTO. The Texas–Mexico region is a perfect location for Chinese companies' global expansion. For its culture and economic structure, Texas could be a strategic partner for the Go Global Program. As the old Chinese proverb says, “flow of a river will change its course every thirty years from west to east and vice versa”. The Torch Program implementation model was birthed in Texas. After 18 years development and great success in China, the Torch Program together with Go Global Program could generate another wave of economic development across the borders of Texas and Mexico. Cooperation between Texas and China could become a new power source for trade and investment growth under the NAFTA framework in the near future.

Torch has created some existing business models for the success of Chinese high tech industry: STIPS and Technology Incubators the most effective. Some sort of partnership could be created between China and Tex-Mex Region by collaboration of public and private sectors. In the process of bringing harmony to cultures through the power of conscience, China could become a new power for NAFTA trade and investment. Texas has a strong base of professional services, R & D and major industries and great potential for logistic operation. Mexico has great mequidor programs and proximity to the U.S. market, which could be natural fit for tri-national cooperation. China may contribute its success in converting a planned economy into a market economy through entrepreneurship creation and technology innovation to be a strategic partner for this tri-lateral cooperation. A true

win-win situation among those three countries will create a most effective value chain for the world economy in the 21<sup>st</sup> century.

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Mr. Shi graduated from the Engineering Physics Department of Qianghua University majoring in Nuclear Physics. Mr. Shi is a national leader who has been responsible in the fields of formulating national energy strategy & policy, managing national R & D strategic development plan and implementation, administrator of national high technology industrialization and international cooperative projects, national negotiator in Nuclear Energy Cooperation with EU and US.

**Mr. Ted Y. Li** is CEO of Omega International Group, Inc. of San Antonio and Chairman of China Advanced Research Center (CHARC). Mr. Li has been very active in developing and promoting tri-lateral cooperation among U.S., China and Mexico. CHARC is a non-profit organization in Texas aimed at promoting cooperation between U.S. and China. CHARC has successfully formed partnership with China Central Party School for leadership creation and exchange programs. CHARC has worked with the China Council for International Investment Promotion CCIP over the last four years to promote China Go Global programs at federal and state levels both in the U.S. and Mexico. Mr. Li played instrumental roles in the development programs of CHARC.

Omega International Group, Inc., is a corporation, which has business lines in investment, business consulting, information technology, real estate development, education and executive training as well as hospitality management with offices in San Antonio, San Francisco, Hong Kong and Beijing. Over twenty five years, Mr. Li has built his expertise in energy, power utility, chemical, mining, telecommunication, logistic, manufacturing, financial services, air transportation, tour operation and hospitality management. He has a MS Degree in Ocean Engineering and BS Degree in Mechanical Engineering.