Open Innovation in China

By Haibo LIU

China has maintained its rapid economic growth for nearly three decades. However, nowadays it faces a few challenges, such as rising environmental pressure, decreasing foreign investment and increasing global competition. Therefore, it is necessary for China to pursue new effective approaches of innovation strategies in order to manage these challenges. As a matter of fact, China has realized that open innovation is a wise and suitable option and has been taking some actions toward this direction.

Tsinghua University's Leading Role

As one of the most prestigious universities in China, Tsinghua University plays significant roles in the country's political and economic development. In May 2005, about one year prior to the National Science and Technology Conference that released the National Mid- and Long-Term Development Plan of Science and Technology (2006-2020), Tsinghua University Press published the translated Chinese version of the book *"Open Innovation: The New Imperative for Creating and Profiting from Technology,"* authored by Professor Henry Chesbrough of the University of California, Berkeley. This introduced the open innovation theory into China for the first time and laid out the foundation for open innovation practices in the country. This is also an indication of Tsinghua University's pioneering role in Chinese development. In fact, Tsinghua University has important influences on China in many aspects. From the university's motto "Self-discipline and Social Commitment," people can sense that serving society is always one of its main missions. Its importance and influences can also be observed from its alumni's leadership positions in the country. Currently, four of the nine standing members of China's Politbureau, including President Hu Jintao, one-fourth of the academician members of the Chinese Academy of Sciences (CAS) and about one-fifth of the academician members of the Chinese Academy of Engineering (CAE) graduated from Tsinghua University.

Since the mid-1990s, the development of a knowledge-based economy has changed people's understanding about knowledge. The Chinese government has encouraged universities to pay more attention to the country's economic development and make more direct contributions to "create wealth" for the country. Tsinghua University has pursued different approaches and made significant efforts toward accomplishing such a mission. It created the "Company Cooperation Committee" in 1995 to widen and deepen the relationship and cooperation between the university and industry. The committee consists of 180 group members currently and 37 of them are foreign companies. It organized about 580 different types of cooperation projects annually on average in recent years, including entrusted projects, joint R&D, joint investigations, joint designs, joint R&D organizations, technology transfer and technology licensing.

Another very significant accomplishment of open innovation at Tsinghua University was the establishment of Tsinghua Science Park (THSP) in 1994. Because THSP is located at the center of Zhongguancun Science Park, which is the Chinese version of Silicon Valley, and neighbors the Tsinghua Campus, it enjoys the benefits of a variety of favorable government policies, convenient support from the university and the park, and easy communication and cooperation with other research institutions and companies in Zhongguancun Science Park, such as CAS institutes. Nowadays, THSP is the most successful university science park in China and has a high worldwide reputation as well, due to its two outstanding features: the sources of hi-tech innovation radiation and the incubators of hi-tech start-up companies.

One of THSP's successful examples is the Large Container Examination System, which is a research project of China's National "8th Five-year Plan", carried out by Tsinghua University. The research results of the project have been transferred to industrial applications through the effort and investment of Tongfang, a Tsinghua-owned publicly listed company based in THSP. The resulting application system has a core of radiation imaging technology integrating with electronic, computer, image processing, control and precision machinery technologies. Furthermore, a new company, named NUCTECH, was set up to develop this system with technology support from the Engineering Physics Department of Tsinghua University. So far, NUCTECH has developed a variety of products, including cargo/vehicle inspection, mail sterilization and X-ray inspection systems, radioactivity monitors and industrial CT equipment used in many fields such as customs, railway/aviation security, industrial manufacturing, medical devices, environmental protection and food processing. NUCTECH currently has 1,200 employees with expertise in the fields of radiation imaging, electronics, information processing, radioprotection and precision machining, and holds the largest market share in the field of high-energy security inspection systems in the world. It has sold more than 210 systems to more than 50 countries all over the world.

Meanwhile, THSP shows more and more notable international attractiveness. Several multinational companies, such as Sun Microsystems, Schlumberger, P&G and NEC, have established their R&D institutes and engineering centers in THSP. Additionally, some of Tsinghua University's functional departments in charge of Tsinghua's technology transfer also placed their offices in THSP, such as Beijing-Tsinghua Industry Development Institute, Hebei-Tsinghua Development Institute, and Department of Science and Technology Development of Tsinghua University, etc. The achievements mentioned above and many more demonstrate that Tsinghua University leads open Innovation in China.

From Market for Technology to Indigenous Innovation

It is natural to say "open door" is a kind of open innovation in China. Since 1978, the "open door" policy adopted as an integral part of China's economic reform has resulted in great progress in the introduction of foreign trade and investment to China, especially highlighted by the event of China's joining the World Trade Organization (WTO) in 2001. Along with China's opening to foreign trade and investment, foreign direct investment (FDI) has facilitated the country's integration into the globalization process and contributed to the country's economic growth. However, this is not satisfactory enough for China because the goal of technology transfer through China's opening up to FDI is still far from fulfillment. Originally, a "market for technology" represented the basic idea of China's hope to access more advanced technologies, know-how and management skills though FDI, which is not the top priority of FDI. FDI has its own strategies in China. It locates fragmented manufacturing processes in the country, leaving most core technologies controlled by foreign partners in joint ventures or by company headquarters outside China. Foreign-invested companies are less R&D-intensive than domestic ones, although this is not specific to China (OECD, 2008). The policy of creating a "market for technology" has not produced immediate and automatic knowledge and technology spillovers from FDI to levels that Chinese policymakers had hoped for. Moreover, current patterns of specialization, a lack of absorptive capacities in Chinese companies and shortcomings in framework conditions, such as a lack of effective intellectual property protection, may have limited technology transfer.

In order to resolve the above problems, the Chinese government made up its mind to innovate indigenously. In the National Mid- and Long-Term Development Plan of Science and Technology (2006-2020), the government puts forward indigenous innovation strategy. The strongest reasoning behind this strategy is to change the situation that hi-tech industries are dominated by FDI. Currently, China's economic growth has heavily depended upon foreign technologies and foreign-invested companies. Since 2000, FDI accounted for more than 80% of all high-tech exports *(China Statistical Yearbook on Science and Technology, 2007)*. Besides, as a side effect of economic growth, a culture of imitation and copying has occurred in China in these years. It is common not only in product development and design, but also in the field of scientific research. It is not good for the national spirit and national sustainable development. Indigenous innovation can help Chinese improve such a situation and inspire innovative activities based on Chinese domestic intelligence.

There are three main policies selected to pursue the indigenous innovation strategy. First, the government plans to increase R&D to 2.5% of GDP from the 2007 level of 1.5% by 2020.

Secondly, a new tax policy makes 150% of R&D expenditure tax-deductible, thus effectively constituting a net subsidy.

Finally, a new policy on public procurement of technology is being adopted to promote indigenous innovation activities in contrast to the current public procurement practice that focuses on increasing transparency of the purchasing process to fight against corruption. The new policy aims to give priority to indigenous innovative products in public procurement in terms of price and volume in various forms.

Open Innovation: the Way Ahead

Basically speaking, there are four kinds of organizational forces for innovation in China: government research institutes (GRIs) and universities, large companies, including state-owned enterprises (SOEs) and non-SOEs, small and medium-sized enterprises (SMEs), and FDI. The Chinese government wants to build a national innovation system (NIS) with enterprises at the center. Currently, in the industrial sector, SOEs have undergone reforms of governance and management, many large non-SOEs such as Huawei, Lenovo and Haier have emerged, and SMEs have become more important players in innovation, driven by competition and entrepreneurship. Anyway, the enterprises are weak in terms of innovation capacity because GRIs and universities are in controlling positions in R&D activities as well as in R&D human resources. The country's increasingly open innovation practices, spurred by FDI, have created significant incentives for structural changes and provided mutual learning opportunities among all kinds of organizations. The model of open innovation is also a good path for China to build an NIS with enterprises at the center.

Open innovation could go very well with indigenous innovation. The OECD (2008) argues, based on a survey of 59 companies in a dozen countries, that open innovation is more about increasing R&D options than about replacing existing ones, and external technological collaboration is complementary to internal R&D investments. In China, the number of R&D centers of multinational companies has increased rapidly these years. According to Maximilian von Zedtwitz's investigation in 2009, there were 199 foreign R&D facilities in China in the beginning of 2004 and the number has reached about 900 by now. Hence, open innovation implies a way of synergies for China's indigenous innovation and FDI's R&D in China.

Actually, the cooperation between foreign companies and GRIs and universities in China is making a new start against the background of open innovation. At the current stage, foreign companies are striving to utilize the existing R&D research capacity and facilities to carry out research projects, which are defined by the foreign companies themselves and modified during the working process to adapt to the local environment. On the other hand, Chinese GRIs and universities are becoming more and more positive to copy these activities of FDI. The mutual benefits generated through such cooperative efforts will not only provide GRIs and universities with additional funding and more advanced equipment, but also generate positive demonstration and spillover effects to GRIs and universities and allow them to get more informed about the international R&D frontier.

Open innovation is a new thinking to guide Chinese companies going abroad to do business as well. In recent years, some Chinese companies in the electronics and ICT sectors have initiated their international R&D activities by either acquiring foreign enterprises/units or setting up R&D sites in advanced countries. For example, in the TCL/Thomson M&A deal, TCL got Thomson's R&D centers in Germany, Singapore and the United States. Similarly, in the Lenovo/IBM deal, Lenovo took over IBM's R&D centers in Japan and the United States. Meanwhile, Hawei has established R&D centers in Stockholm (Sweden), Dallas and Silicon Valley (the United States), Bangalore (India), and Moscow (Russia). These M&A deals and offshore R&D centers serve China to understand and learn open innovation.

However, open innovation in China is just at its infancy. A survey of 181 senior executives in China conducted by the Economist Intelligence Unit in June 2009 found that China lags in applying the concept of open innovation: only 17% of respondents say partners are important sources of new ideas, compared with 34% in a global survey. Chinese company executives often cited a lack of trust, including the fear of reverse engineering or piracy, as a reason for not working with external organizations. To be honest, open innovation is not easy for Chinese, but China does not have other choices. **JS**

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