

IT Innovation and the Development of Information Industry

Gou Zhongwen

Vice Minister, Ministry of Information Industry, China

ABSTRACT

Market application is the driving force for the innovation of information technology. The success of information technology, as a final analysis, is the success of its application. The demand for application has stimulated the development of technology. Application innovation has become one of the main directions in current IT innovation. Technology innovation should focus on the application and market, should be customer-oriented, and should be aimed at meeting the application needs of customers and improving the living standard of the people. To continuously accumulate our own IPRs through application innovation is a feasible way to develop China's information industry. The accelerated progress of technology makes the ability of businesses to utilize external knowledge increasingly important. To enhance the ability of utilizing external knowledge is a shortcut to the improvement of the technology innovation ability of Chinese businesses. From the strategic point of view of improving the nation's competitiveness, it's the responsibility of the government to support the technology innovation of businesses. The government should provide public services in the following aspects: First, provide public technical services, and provide guidance to the development of organizations providing such services; secondly, enhance the technology exchange market, and create a sound social environment for the businesses to utilize

external knowledge; and thirdly, support the R&D of key technologies and their commercialization.

Key words: information technology, information industry, innovation

I. MARKET APPLICATION IS THE DRIVING FORCE FOR THE INNOVATION OF INFORMATION TECHNOLOGY

Today, information technology is in rapid change, and is penetrating to various sectors of our economic society, increasingly having a profound impact on the development of human society. Now we all can deeply feel the ubiquitous presence of information technology in every corner of our society, and our daily work and life can't do without computers, the Internet, mobile phones, and other information tools; traditional industries like the auto industry, the steel & iron industry, the petro-chemical industry and the power industry have become increasingly in need of the support of information technology; and sectors including finance and insurance, communication and transportation, education and culture, urban management, and social services have also increasingly become dependent on information technology. We can say that, among today's new and high technologies, information technology has the fastest growth, the widest application, and the most promi-

ment contribution to social and economic development.

The success of information technology is essentially the success of its application. Looking back at the development history of information technology, we can see that the mutual support between technology innovation and application promotion and the sound cycle from industrial development to market exploration are the fundamental experiences for the success of information technology and information industry. Technology innovations that are application and market oriented often can be successful in commercialization, the technologies can be widely applied, and related companies can grow big. In the development process of information industry, no matter it's microelectronic technology, computer technology, communication technology, software technology or networking technology, the success of development can all be attributed to the success of application. In other words, application has won the market, and application has obtained the energy for sustainable development. It's because IT innovation has always been able to be application and market-oriented in general by continuously developing products and services well received by the users that information industry can maintain a high-speed growth, becoming a tremendous driving force for social and economic development and resulting in sound economic and social benefits.

II. APPLICATION INNOVATION IS THE BASIC DIRECTION OF CURRENT TECHNOLOGY INNOVATION

In the 21st century, the requirements of human society for information products are becoming higher and higher. People have an increasingly strong expectation for the ability to get online anywhere and any time, for mobile office, for wireless connectivity, and for the unification between computing and communication functions. The demand for applications has stimulated the development of technology, and application innovation has become one of the main directions of current IT innovation. Some major multi-national companies (MNCs) are developing products with a convergence of

computing and communication technologies. Their slogan is, "to let every computer be used as a communication tool, and to let every communication tool be used as a computer". This is an application innovation path characterized by technology convergence. Some other MNCs are shifting from "providing a single product" towards "providing system service and integrated solutions", and this is an application innovation path characterized by technology integration. These phenomena are sufficient to show that the technology innovations of IT giants in the world are moving towards promoting applications and expanding markets.

We should attach great importance to the development trends of MNCs. We need to seriously study and explore our roads for IT innovation based on the actual situation of China and try to get an accurate understanding of the major directions of technology innovation. We need to further make it clear that our technology innovation should also focus on the application and market, should be customer-oriented, and should be aimed at meeting the application needs of customers and improving the living standard. At the same time, we should also see that China is in the process of industrialization, traditional industries will still be the major pillars of the economy, and will also be the big market for the application of information technology. In pursuing a new industrialization path, we need to focus the innovation and application of information technology on the reforming of traditional industries and the use in social service sectors, so as to make breakthroughs in selected areas and move forward in an all-round way, and to create a sound development mechanism that is "to drive technology innovation with the application and to promote application with technology innovation".

III. TO CONTINUOUSLY ACCUMULATE OUR OWN IPRS THROUGH APPLICATION INNOVATION IS A FEASIBLE WAY TO DEVELOP CHINA'S INFORMATION INDUSTRY

After years of high-speed growth, China's information industry has become a big industry: the size of China's

telecommunications network is number one in the world, the size of China's electronic manufacturing sector is number three in the world, and the production of TV sets, mobile phones, DVD, and many other electronic information products ranks first in the world, making China one of the powerhouses in the global information industry. But we all know that China's information industry started from the processing industry, the ability of technology innovation is not strong, and we have long been reliant on others in core technologies. In recent years, with the rapid growth of our export of electronic information products, problems associated with IPR disputes and patent fees are getting increasingly prominent, having a big impact on the development of the industry. From strategic development point of view, we should improve our innovation ability, overcome the constraints of core technologies, and make further effort to become a strong country in the world in terms of information industry. But how to make breakthroughs in core technologies to realize self-dependent development has always been the focus and the hard nut to crack for China's information industry.

Currently, most domestic companies do not have sufficient financial resources and R&D spending, and their technology innovation ability is also not strong enough to make breakthroughs in core technologies in a short time. But this is not to say that we can do nothing but wait. Technologies are multi-layered. There are core technologies as well as applied technologies; there are basic technologies as well as product design technologies and production technologies; and there are original IPRs as well as secondary IPRs developed on the basis of original ones. A century ago, an American painter bound erasers and pencils together, and this little invention became a patent valuing at 550,000 US dollars. Ford used engines on horse-drawn wagons, which became automobiles, leading to the birth of a huge industry. So we can see that **innovations in applied technologies are less expensive and can get returns fast, and are therefore a path for technology innovation suitable for China.** In recent years, a number of domestic companies like Huawei, Langchao, Datang, and Lenovo have been doing quite well in application

innovation, and have designed a lot of innovative information products highly welcomed by the users. **Compared with their counterparts in developed countries, domestic companies have some advantages in application innovation, and our opportunity lies in application innovation.** We need to continue to highlight our strong points and avoid our weak points, to seek unique routes, to give play of our advantages in applied technologies, product design technologies and production technologies, and to continuously accumulate R&D experiences and funds through innovation in applied technologies to get closer to core technologies step by step. We believe that core technologies are not insurmountable, and we just need to do something down to earth and to accumulate experiences one by one, we will eventually be able to make breakthroughs in getting our IPRs of core technologies and to realize the critical jump from being big to being strong in the information industry.

IV. IN TECHNOLOGY INNOVATION, BUSINESSES SHOULD TAKE GOOD USE OF EXTERNAL KNOWLEDGE

Competition among modern companies is to a big extent the competition of knowledge, technology and information. To obtain knowledge, technology and information, a company needs to rely on the R&D and innovation of its own on the one hand, and should also be good at utilizing the innovations of others on the other hand.

The accelerated progress of technology makes the ability of businesses to utilize external knowledge increasingly important. In modern economy, the progress of technology is getting increasingly faster, and the life cycle of products shorter. A new technology or new product took several decades to realize commercialization in the past, and takes only a few years or even a few months to do it nowadays. In the 19th century, it took 282 years for electricity to be used after its invention, and it took 26 years for electromagnetic waves to be used in communications. Yet in the 20th century, IC boards were able to be used only in 7

years after their invention, and laser technology took only one year for application. Under such a situation, the competition of companies has changed its way from scale to speed, and from cost and price to knowledge. Those who can obtain the most up-to-date knowledge and use it at the quickest pace can be the first to market. To obtain knowledge as a first one, a company does not need to develop all the technologies by itself. Instead, it should increasingly pursue the “externalization” path, relying on external market to meet its need for knowledge. Because the labor division in technologies improves R&D efficiency, obtaining technologies from external sources is not only less expensive, but also has the potential of enabling companies to be in the forefront in using the latest technologies all the time. Thus, the ability to fully explore and utilization external knowledge is critical for companies to gain competitive advantages.

In recent years, many MNCs have improved their innovation ability and strengthened their competitive advantages through comprehensive utilization of external knowledge. MNCs often obtain and utilize external knowledge through purchasing patents, setting up technical consortiums, exchanging information and third-party R&D. American companies have obtained many new technologies from universities and research institutes through various channels, and have obtained lots of information about domestic and international markets through media organizations. Japanese and Korean companies purchase hundreds and thousands of patented technologies from abroad each year. Many MNCs are changing the strategy of treating competitors as enemies and are moving towards deep level technical cooperation and strategic alliance. In 2003, the United States spent USD1.61 billion on importing technologies, and Japan spent USD9.8 billion on this. Japanese and Korean companies are also mimicking and doing secondary development on the back of purchasing patented technologies, and this has helped to shorten the time needed to catch up with the advanced countries in the world. The United States has set up

5000 new technology R&D leagues with foreign companies in key areas including new materials, information and biotechnology in the last 10 years. Before 1980, the revenue of the top 1000 companies in the United States from these technology leagues was only 1% of their total revenue. But by 2003, the figure had already reached 20%. Through cooperative R&D, MNCs not only can concentrate resources in tackling key technologies, but also can disperse R&D cost and investment risk, as well as benefiting from accelerated industrialization and shortened the return period of technology investment through results sharing. This ability of utilizing external technologies makes it possible for MNCs to be highly flexible in response to competition in the international arena.

These experiences show that in the era of knowledge economy, in order to take an advantageous position in intense international competition, companies not only need to enhance their own innovation ability and knowledge development ability, but also must be good at utilizing external knowledge and achieve the objective of improving innovation ability and competitiveness through the integrated use of both internal and external knowledge.

Compared with companies in developed countries, China's domestic companies are relatively weak in utilizing external knowledge. The number of patented technologies we imported from abroad is small, technical cooperation between companies is also rare, and malignant competitions and over-competitions in a given trade are serious problems. Being not good at utilizing external knowledge has limited the technology innovation ability of Chinese companies. Therefore, I think, [improving the ability to utilize external knowledge is a shortcut to improve the technology innovation ability of Chinese companies.](#) At present, we already have a substantial scale advantage in quite a few manufacturing fields, upgrading industrial structure is a very urgent task, but the weak industry technical force and the inadequate innovation ability have become the bottleneck constraining industrial upgrade. Relatively speaking, relying on one's own knowledge development and

technology innovation to improve technical ability takes a long time and a substantial investment. Now international competition does not allow us to spend a long time to shorten the gap in technologies, and due to our national situation, it's not likely for us to invest heavily in R&D like the western countries. In this situation, improving the ability of companies in utilizing knowledge and taking full advantage of existing R&D results both at home and abroad is a feasible way for China to shorten the gap in technologies and to improve the technology innovation ability.

V. THE GOVERNMENT SHOULD MAKE EFFORTS TO SUPPORT TECHNOLOGY INNOVATION

Industries should be the main force in technology innovation, but government should also give strong support. Businesses are the basic units of the national economy, and the prosperity of the nation relies on the growth of businesses as a final analysis. **From the strategic point of view of improving the nation's competence, it's the responsibility of the government to support the technology innovation of businesses.** Technology innovation requires huge investment. But R&D results have a strong external effect, and the risk of investment is high. Therefore, it is necessary for the government to encourage and support businesses based on technology innovation through various measures. For those common technologies and basic technologies, which are of the nature of public goods, market mechanism does not work to a big extent, and government must have a considerable involvement, or even dominate the R&D of these technologies. In fact, providing support for R&D innovations of businesses using public resources is the common practice in many developed countries in the world. The United States, Japan and many other countries all have a big budget to support the R&D activities of some R&D organizations on key and core information technologies, and transfer advanced technologies to businesses through these R&D organizations. This practice is fully in line with

WTO rules. In terms of China's information industry, the accumulation time of both technology and capital is short, and compared with major MNCs in the world, China's domestic businesses are not only small in size, but also very weak in capital and technical strength, and their participation in international innovation competition asks in particular for the assistance and support of the government.

In order to help businesses utilize knowledge and improve their technology innovation ability, I believe, the government should provide public services in the following aspects:

First, provide public technical services, and provide guidance to the development of organizations providing such services. The government can provide public services for businesses in technology exchange and technical cooperation, set up industry-level common technology service organizations, lower capital risk and technical threshold for industry innovations, and help businesses improve their innovation ability. For example, in the information industry, with regard to bottleneck factors constraining the development of the industry including software and IC design, we need to concentrate the dispersed technical resources, establish government-dominated technology development platforms, organize R&D on common technologies and matching technologies, and provide technical support for businesses, especially small and medium-sized enterprises (SMEs). At the same time, we need to form technical R&D leagues in which different parties cooperate with each other, create a technology innovation system with businesses as the main force, help businesses set up technology development centers and experimental bases for commercialization, and develop the ability of businesses for sustained innovations.

Secondly, enhance the technology exchange market, and create a sound social environment for businesses to utilize external knowledge. In order to encourage knowledge development and utilization, we need to quicken our steps for the commercialization of knowledge products, to create a technology exchange market that adopts international practices,

to drive home the idea of respecting technologies and IPR protection in the whole society. In the legalization and institutional front, we need to form an incentive mechanism that is useful in protecting the owners of technologies. We should encourage knowledge development and technical transfer and develop brokerage service, to provide a channel for those who are in need of external knowledge, so that the economic and social development can be based on knowledge innovation and knowledge utilization.

Thirdly, support the R&D of key technologies and their commercialization. Both developed countries like the United States and the emerging industrialized countries like Korea are attaching great importance to the dominant role of government in key technology fields, and are using various measures to support businesses in making breakthroughs in key and important technologies. For example, Korea leads the world in CDMA technology. The government mobilized resources of the whole country to buy the core technology, offer it to many businesses through the public service platform, and encourage the businesses to continue to make R&D and to realize commercialization rapidly on this basis. The case of the R&D of color TV chips in Japan is similar: The government made the R&D centrally, and provided the patent to many businesses, so that the business had the ability to make R&D in the development stage. Currently, in view that China's domestic businesses do not have adequate R&D input and the government R&D funding is also limited, we should concentrate resources and use the limited leveraging money of the government to the R&D of major common technologies and key technologies, so that the businesses can use the R&D results on a fair, low-cost and low-risk basis, and can also make secondary innovations based on these technologies to improve their innovation ability and competitiveness.

The 21st century is a century of knowledge economy, and science and technology will play a more important role in international competition. Both the invigoration of the people and the prosperity of the nation are dependent on the joint effort of the academics and the industries. Only the teaming up and cooperation of the

academics and the industries can facilitate the forming of a sound mechanism in which technology innovation and industry development can support each other, and can play the role of science and technology as the first productive force to the maximum.

BIOGRAPHY

Mr. Gou Zhongwen was born in Zhenyuan, Gansu of China in June 1957. He graduated from



the Electronics Engineering Department of the Northwest Institute of Telecom Engineering in 1981. In Jan, 1989, he received a master's degree in engineering from the

Xi'an University of Electronics Science and Technology. He successively took the post of Deputy Director of the No.29 Research Institute of the Ministry of Mechanical and Electric Industry, Deputy Director of the No.29 Research Institute of the Ministry of Electronics Industry, Deputy Director of the Division for Science & Technology and Quality Monitoring, and Director of the Research Center for the Development of Computers and Microelectronics under the Ministry of Electronics Industry. He became President of CCID in Oct, 2000, and he has been Vice Minister of the Ministry of Information Industry since Feb 2002. In recent years, he has been engaged in industrial administration in the information industry, and accumulated rich experiences in the mutual support and mutual promotion between information technology innovation and information industry development in China.