

# Innovation, Learning and E-Commerce

Jin CHEN

( Research Center for Innovation & Management  
Zhejiang University , Hangzhou, China 310027 )

**Abstract:** As a country in process of economic transformation, China faces the transformation of the technology, via the imminence of enhancing the innovative and learning capabilities. The E-commerce will help Chinese enterprise ride the staggerity and phasity of the traditional technological innovation and learning, and get quicker technological advance. This paper will demonstrate this aspect and give some policy suggestions on innovation and learning based on E-commerce from the view of the national innovation system.

**Key Words:** E-commerce; Technological Innovation; Learning

## 1. The Necessity of the Technological Innovation in China

Technological innovation is in a malign cycle from introduction to dropping behind and to reintroduction in China now, in many hi-tech areas the gap is getting wider. The general indicator, the percent of R&D to GNP is in serious shortage. It is reported that the proportion of innovative degree to the sales of the new products is rather low, about 10 percent and in a low increasing speed in all the industries. It will seriously hind the development of the Chinese enterprise, means that Chinese enterprise is in badly need of innovation.

**Table 1. The proportion of innovative degree ---sales of new products in China:  
1994-1998**

	1994	1995	1996	1997	1998
Textile	6.59	5.79	7.04	7.14	8.63
Chemistry	7.37	8.44	6.89	6.83	9.38
Pharmacy	13.00	11.03	10.62	12.75	12.662
Machine	34.28	17.28	17.95	20.00	23.07
Eletro- mmunication	33.67	25.60	33.03	29.08	36.46
Avg	10.22	8.50	10.08	10.00	11.66

Source: *Chinese annul report of S&T statistic*

unit: %

Therefore, the key elements of China's development strategy are as follows: promoting the advancement of S&T vigorously, reinforcing the technological innovation, speeding up the transformation of S&T outcome into practical productivity, taking

initiatives to develop the S&T, and upstaging the technological development to a higher level. The core of competition among all countries in terms of comprehensive national power is technological innovation and hi-tech industrialization. In the 21<sup>st</sup> century, China will speed up the S&T advancement and technological innovation more than ever. Only if the innovative activities are brisk in a country, can the economy be advanced rapidly, and can the environment for economic transformation be better improved.

## **2.The Application of E-commerce will quicken the Innovation Process within Chinese Enterprises**

Many researchers, developers and clients have paid much attention to the research and application of E-commerce in recent years. Concepts like cooperation under the supporting of computer, office without paper, form transferring, cooperation system, OA were put forward earlier, but have been neglected for the limitation of the technology to realize them. With the popularization of the high performance microcomputers and with the development of distribute network communication and BPR technology, these will soon be realized. As the scales of enterprises are expanding unceasingly, the information resources are increasing in surprising speed incessantly. The present isomerous, distributive, loose and coupling computing environment, virtual organization, distribution decision, C/S structure, federal system and distribution process technology (WWW, Java, CORBA, OLE) all foretell the end of the single and central processing of information. Being keen on the merits of E-commerce, some enterprises in China have begun to reform the business procedures through E-commerce with the help of higher institutions and research organizations, such as to restructure the registration-process in the industry and commerce administration service, the online shopping geared to the future E-commerce, and TQM process facing manufacture, etc.

As shown from our experimentation, the main advantages of E-commerce's applications to technological innovation (or New Product Development: NPD) are as follows:

1. Speed up the transferring of the NPD information in the various departments, as the traditional model of NPD is of low efficiency.
2. Standardize the process of NPD, as the traditional technological innovation is more controlled by humans. Through E-commerce the standardized process can be achieved and the individual developer' capacity can be brought into full display.
3. As E-commerce can transfer the documents of NPD, and will therefore enhance the efficiency of NPD research team.
4. It can improve NPD macro management in enterprise technological centers and other organizational senior administration. For example, the real time monitor and control of NPD process displays the state of use of the NPD resources. It will help to fulfill the NPD plan.

The NPD in the future needs to address the following:

1. The work flow from NPD to market: with the maturing of E-commerce, NPD should comply to the need of customers closely; with the maturing of more technologies, the work flow system spanning the technology departments and the market (including multi web/work flow server based on internet) will be of great prospect.
2. Distribution NPD work flow: with the localization and internationalization of R&D resources, the management system of NPD is to be enlarged from supporting single project team to meeting the functional requirements at enterprise groups level. Then, single workflow should span multi servers and clients on the WEB, actualize its extensibility, manageability through side-by-side computing, resource sharing so as to make full use of R&D resources openly.

In a word, with the perfecting of the research work and E-commerce, a new product innovation paradigm based on E-commerce & E-innovation will emerge, and it will create favorable conditions for the developing countries like China to conduct technological innovation in a high speed.

### **3.E-commerce and Technological Learning**

Successful countries have undergone development phases of following, assimilating, learning and improving in the initial stages, and then achieve independent technological innovation. But technological learning is a necessary developing stage for any country. Korea is typical in this regard. Only in 30 years Korea has developed from an autarkic agricultural country into a burgeoning industrialized country. Researchers in Korea pointed out that technological track for developing countries should go through phases of acquisition, absorption, and improvement in general, just the reverse order of that in the developed countries.

But staggered technological learning modes (such as Linsu Kim's innovative imitation) of burgeoning industrialization countries or regions like Korea (traditional) are not necessarily fit for China, because the social background of Korea then was distinctly different from that of China now.

Firstly, with the increase in the technological integration of product, the difficulty of imitation is augmented. Many products cannot be reversed in engineering. Secondly, Korea's S&T level was far below that of developed countries in 1960s and 1970s. But it is our advantage that some aspects of our country's S&T are competitive enough, which would be of great help. Considering the S&T level of Korea, it is feasible for technological learning to go through acquisition, absorption and improvement, but China can surmount the low-grade technological learning, by directly entering into the phase of improvement or even independent innovation phase by integrating self-possessed advanced technology. Thirdly, syndicates in Korea like Samsung, Daewoo, LG and so on, all listed in the Top 100 enterprises in the world, are strong impetus of development. Just as Schumpeter puts it that a certain extent monopoly can stimulate innovation, the huge syndicates of Korea are the origin of innovation. But China, however, lack of this kind of

huge enterprises.

It is the most important that the world economic structure has been changed greatly, industrial economy is during a transition to knowledge economy. In the new society due to economic revolution caused by IT, learning manner has been changed greatly by reason of the convenience and swiftness of digital network. It is more important for China to surmount the staggered and single-sided traditional technological learning. Therefore, a notion of long-term and overall technological learning needs to be introduced to China, namely the notion of technological hyper-learning based on E-commerce.

The concept, *technological hyper-learning*, was put forward by Carayannis in 1999 first. In 1998, Carayannis brought forward the concept, senior technological learning. He considered that senior technological learning a process that help to absorb, deal and create knowledge and marketing wisdom for long-range goals, the knowledge and wisdom are produced by the interaction between product and market, enterprise and market, product and enterprise. Senior technological learning will help develop new competitive areas by improving and innovating organizational routines to augment the slope of learning curve and decrease the learning time. So, the core for sustainable development in technological enterprises is to implement three parallel learning strategies---strategic, tactical and operational in the enterprise, in table 2.

**Table 2 class of technological learning: strategic, tactical and operational**

		Personal	Organizational
Operational Technological learning	Tacit	Skill, special knowledge	Organizational background, working practice
	Explicit	Rude routine, process	Training, legend
Tactical Technological learning	Tacit	General knowledge, sense	Working time, capability
	Explicit	Design routine, process	Best practice, work process
Strategic Technological learning	Tacit	Wisdom, intuition	Organizational wisdom
	Explicit	Dynamic design routine	Business reengineering

Source : Carayannis , 1998

In order to carry out effective technological hyper-learning, the enterprises have to manage various knowledge. The learning in enterprise will be simplified with the support of E-commerce. Enterprises have changed greatly by reason of the development of technologies pertinent to E-commerce. For example, some new changes have emerged because of the development of Internet/Intranet, such as cutting down the administrative levels, changing mode of the lower levels being responsible for the higher into mode of all responsible for customers, BPR, virtual enterprise. Because of the development of CAD/CAM/CIMS, the flexible manufacture system, agile manufacture system and real-time manufacture system have been erected in R&D and manufacturing to speed up the designing and manufacturing of products and satisfy customers' personal demand. Along with the emergence of technologies of database and groupware, there are also

great changes in marketing and organizational behavior. Furthermore, the effect of BBS, E-mail and E-meeting act on knowledge communication and learning has no substitution. BBS, which simulates the environment of face-to-face communication, make the communication of knowledge unlimited by boundaries, incarnate the principle of sharing knowledge. E-mail and E-meeting have therefore sped up the communication. These all save the cost of communication to a great extent.

We now grade the technological learning of a certain company from 1994 to 1998 according to the indicators above. In order to reflect the relation between technological hyper-learning, technological capability and whole capability, in figure 1 we select technological hyper-learning(X) into independent variable and whole( Y-sales ) into dependent variable. We find that enterprise's benefit is correlative to technological hyper-learning based on E-commerce.

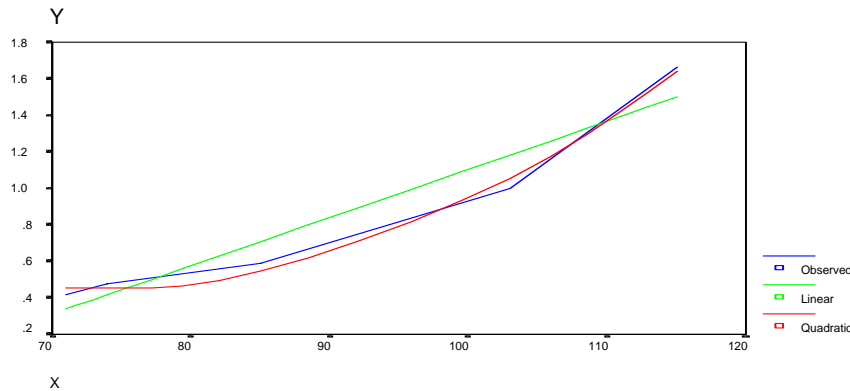


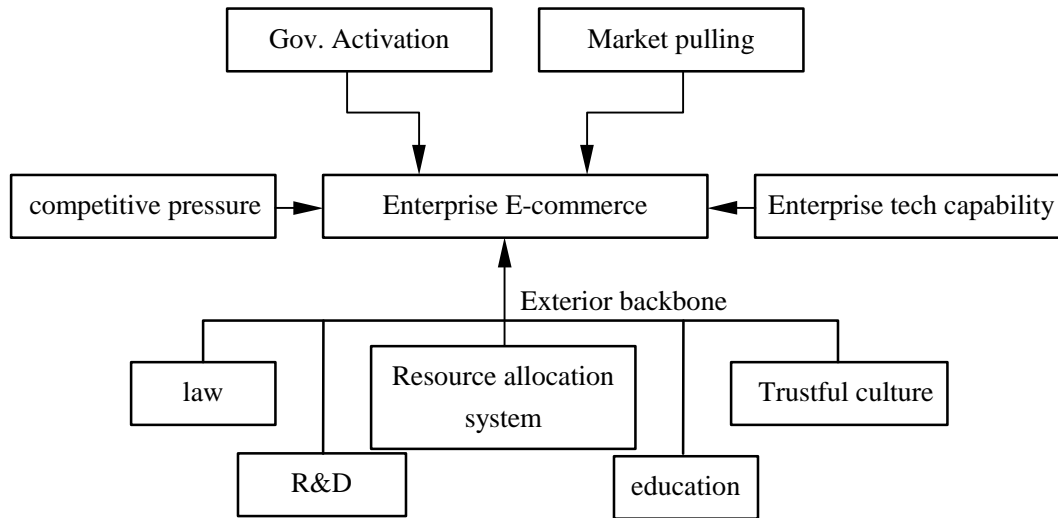
Figure 1 The Correlation of enterprise Overall Capability (Y) with Technological hyper-learning capability (X)

Technological hyper-learning, all-around learning, completely surmount traditional staggered and single-side technological learning, upgrade the learning speed and efficiency of enterprise, and boost technological innovation capability of enterprise. We can make full use of E-commerce technology in learning media so as to make learning convenient and speedy. China should attach importance to technological hyper-learning capability based on E-commerce. It is the only way to catch up with and even exceed developed countries.

#### 4. E-commerce Development policies from the perspective of National Innovation System.

Despite the importance of E-commerce to the technological innovation and to the technological learning in developing countries like China, the E-commerce is a luxury technology to most developing countries. Individual enterprises could hardly afford such a large investment. Market has a self-organizational and intensified stimulant effect on the development of E-commerce. But there exist some problems: (1) It can not ensure an optimized allocation of E-commerce. (2) Market can promote E-commerce by substantive due yield, but cannot avoid high risk of E-commerce activities. Hence, we

need to emphasize the effect the National Innovation System on E-commerce. In figure 2, we figure out the policy framework of National Innovation System and E-commerce.



**Figure 2. E-commerce mechanism based on National Innovation System**

According to Figure 2, E-commerce policy behavior should focused on the following three aspects.

(1) Education system

E-commerce awareness of Chinese people is an important factor to the innovation and diffusion of E-commerce. Therefore, we need to speed up the reformation of educational system, renewal of education structure and specialty setting, training E-commerce professionals with ability and strong innovative sense through supporting professional information and network institutions.

We deepen the education of basic computer knowledge, make known telephone and E-commerce knowledge, advocate the use of Internet, and thus create an atmosphere in which everyone feels necessary to use E-commerce. The perfection of education system. is the key to guarantee innovation, upgrade learning capability and increase the capability of E-commerce application.

(2) R&D system

AS most medium and small enterprises are short of the technological capability to develop E-commerce in China, universities and research organizations should help to develop first-class E-commerce platform. The co-innovation between enterprises and universities will upgrade enterprises' technological capabilities and the E-commerce level.

( 3 )Cultivate trustful culture

Stiglitz considered that the foundation of success of Chinese reformation is the system evolvement based on social capital. He thought that some augmentation theories consider not only the devoted production factors, but also the social capital. The social capital of some transitional countries is much weaker than before. Social capital has prodigious effect on technological innovation, learning between enterprise and improving

specialization. It can also help to realize the real E-commerce in China.

## References

- 1 . Chen Jin , (2000). *Exploration of National Technological Development System* , Science Press.
- 2 . Chen Jin , (2001). *Sustainable Development—perspective on enterprises' technological innovation* , Science Press.
- 3 . Freeman, (1988). *Japan's National Innovation System. In: Technical Change and Economic Theory* (G. Dosi, ed.), Printer.
- 4 . R. R. Nelson. *National Innovation Systems: A Comparative Analysis. Oxford: Oxford University Press, 1993*
- 5 . H. S. Choi. *Base for Science and Technology Promotion in Developing Countries. Tokyo: Asian Productivity Organization, 1983*
- 6 . Carayannis, Elias G.: *The strategic management of technological learning in project/program management : the role of extranets, intranets and intelligent agents in knowledge generation ,diffusion, and leveraging, Technovation, Vol.18, No.11, 1998*
- 7 . Koh Al-kee: *Organizational learning in successful East Asian firms: principles, practices, and prospects, Technological Forecasting and Social Change 58, 285-295 (1998)*
- 8 . Teece, David J., Gary Pisano and Amy Shuen: "Dynamic capabilities and strategic management" ,*Strategic Management Journal,Vol.18:7,509-533(1997)*