Innovation-Oriented Learning through Industrial Paradigm-shift

--- Comparative Study on Current Chinese Companies ---

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Abstract

Managers in the last two decades have witnessed a period of change unparalleled in the history of the world, in terms of advances in technology, globalization of markets, and stabilization of political economies. With the increasing number of "world-class" competitors both domestically and abroad, organizations have had to improve their internal processes rapidly in order to stay competitive. In the 1960s-1970s, companies began to develop detailed market strategies, which focused on creating and capturing customer loyalty. Organizations also realized that strong engineering, design, and manufacturing functions were necessary in order to support these market requirements. Design engineers had to be able to translate customer needs into product and service specifications, which then had to be produced at a high level of quality and at a reasonable cost. As the demand for new products escalated in the 1980s, manufacturing organizations were required to become increasingly flexible and responsive to modify existing products and processes or to develop new ones in order to meet ever-changing customer needs. As manufacturing capacities improved in the 1990s, managers realized that material and service inputs from suppliers had a major impact on their organizations' ability to meet customer needs. This led to an increased focus on the supply base and the organization's sourcing strategy. Managers also realized that producing a quality product was not enough. Getting the products to customers when, where, how, and in the quantity that they want, in a cost-effective manner, constituted an entirely new type of challenge. Since the end of 20th century, the fast development of information technology, in combination with that of computer technology and internet technology, has engendered a deep revolution in human life and society configuration. Facing the market challenges, entrepreneurs and managers are trying to seek for a way for enterprises' survival and long-term development.

21st century is called as the era of "Knowledge Society". Knowledge is increasingly recognized by modern organizations as their most important tool and basis of innovation and the indispensable source of lasting competitive advantage. According to researchers (e.g. Thomas et al., 2001), both knowledge management and knowledge creation utilize theories of organizational learning as a platform for providing insight into how organizations can acquire, interpret, distribute, and acculturate knowledge to facilitate and create competitive distinction. In addition, organization theory, industrial economics, economic history, and business, management and innovation studies all approach the question of how organizations learn. However, research on these subjects is concentrated mainly in advanced countries (e.g. Argyris and Schon, 1978, Dodgson, 1993, Nonaka and Takeuchi, 1995, Utterback, 1994, Von Hippel, 1988). Despite the fact that many developing countries have made significant progress in industrial, educational, and technology development, research on learning, capability building and innovation in those countries is scanty.

China has been in the transition stage from planned economy to market economy since 1978. Strictly speaking, there were no real enterprises in the sense of modern company theory in planned economy age, because they were just "workshops" subordinate to the government. Not until the economic reforms since 1980s have there appeared independent corporate enterprises. Currently, China is a developing country with unique characteristics because it is still keeping socialism and at the same time it is moving towards a market economy with a centralized innovation system in transition, which could not be seen in the history of the world. Generally speaking, Chinese firms' internal and external environments have changed greatly. It is essential for Chinese firms to accumulate and create knowledge through effective organizational learning for innovation capacities and future development. Studies on

organizational learning issue in transition economy countries, such as China, will contribute to understand the theories on organizational learning and knowledge management created in advanced countries.

In this research, two successful cases of Chinese public corporations (See Note 1) in the background of China's transit economy and industrial paradigm-shift are studied. The purpose is to depict the case companies' organizational learning manner and process from the perspective of knowledge accumulation, transfer and creation, and at the same time to expound the external and internal factors of success. Through careful comparison and analysis of these two cases, the author is aiming to search for some important implications for Chinese firms in transition and paradigm-shift.

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1.1 Background introduction

1.1.1 Background of the Study

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1.1.2 Introduction of China's Transitional Economy

After nearly 30 years' efforts, China has achieved great accomplishment. According to *China Statistical Yearbook,* from 1979 to 2002, the average annual growth rate of China's real GDP reached 9.4%, and that of the real GDP per capita 8.1%; in 2002 China's total export and import amounted to 325.61 billion USD and 295.31 billion USD respectively. With the fast growing of economy, the living standards of citizens also enhanced significantly: the net income per capita of rural residents has increased from 133.6 RMB Yuan in 1978 to 2713.0 RMB Yuan in 2002, the disposable income per capita of urban residents has increased from 343.4 RMB Yuan in 1978 to 7702.8 RMB Yuan in 2002, and according to comparable prices, the annual growth rates are 7.6% and 8.1% respectively. China should owe her great achievements to the Open Door policy and economic reform. They engendered a transition from planned economy to market-oriented economy, which has greatly raised Chinese's companies' vitality.

Before 1978, 791 products were controlled under the production and distribution

plans made by the central government. But as of year 2005, those categories of products have been reduced to only five, and the rest have been shifted to the free economy market products. Nowadays, those products are being sold in department stores, supermarkets and chain stores, which are scattered everywhere in both rural and urban areas. Meanwhile commercial business of electronic products has developed rapidly, the agent system has been widely adopted by various trades, and great progress has been made in the circulation and delivery of commodities. New material circulation enterprises have replaced traditional storage and transport enterprises. A great variety of food, clothing and other commodities satisfy the needs of consumers. The total market sales grow each year. At the same time a wholesalers' market has appeared in the commodities sector in which the supply and demand of most commodities are kept in balance, the supply of some goods exceeds the demand, price trends are steady, and the guiding function of the market for producers has been strengthened. As a result, the rights given to private enterprises for purchasing, producing and selling commodities have been extended. Enterprises may organize and establish wholesale markets and trading centers, the wholesale and retail commercial systems are being restructured. Through the reform, the unitary pattern in which the government-control economy monopolized commercial activities has been shifted year by year and step by step. The commodity market pattern of diversified economic elements and operation systems with government ownership of commerce has been established as the main body. Since the reform and opening began, China has continuously expanded the capital market by improving the credit and loan mechanism, and developing stock and government bonds markets. At the beginning of the 1980s, the reform of the credit and loan mechanism, beginning with "unified plan, multi-level control, connect of deposits with loans, and being responsible for making up differences" was developed in accordance with the ratio between assets and debts,

and eliminating the limits for the sizes of loans. In order to match this important change, new measures have been adopted, such as making market business public, thus standardizing and strengthening the control and adjustment of the credit and loan market. At the same time, the stock market grew from nothing to become a large-scale as symbolized by the Shanghai and Shenzhen stock exchanges.

Generally speaking, the process of the economic reform in China is following the route of giving guide to market mechanisms. Socialist market economy is characterized by the guiding principle that the government's macro-control is dominant and to have trends to control economic elements that are allowed to develop to enable the market to play a fundamental role in resource allocation and distribution. Since China is on the transitional economic stage from Planned Economy to Market Economy, a series of macro-adjustment and control measures are being adopted to carry out the reform in depth and in all aspects. The governmental ownership will continue to be the main form of ownership as various types of ownership are jointly developed, the operation mechanism of government –owned enterprises will be further transformed to meet the requirements of the market economy, the property rights and responsibilities of enterprises will be clearly defined. The open and unified national market system will be established, closely integrating urban and rural markets, providing for reciprocal flows between domestic and international markets, and promoting the optimization of resource allocation, changing the government's function in economic management and establishing an optimal macro-regulatory system chiefly employing indirect means, an income distribution system based on distribution according to work done will be established in which efficiency is given precedence and fairness in distribution is taken into account, a multi-tier social security system will be set up to accelerate the development of China's economy.

To be concrete, some essential changes happened in the process of China's

economic transition.

1) The Government's role in economy changed greatly. Prior to reform, the role of government in the economy was pervasive. The central government produced, planned and distributed practically all output. The bulk of resources, including land, labor, raw materials and final output were allocated under the government's planning system. Production and distribution plans were determined by the central and lower levels of government and implemented by government-owned production or distribution enterprises. Most inputs were supplied in accordance with the government plan and most outputs were purchased and distributed as well. Private enterprises were generally not permitted. Over three quarters of industrial output was produced by the government-owned enterprises. All of the rest was produced by urban and rural collectives. There were no foreign owned or private sectors.

The government's role in the economy has changed considerably over the reform period as a more market-based economy. Hence in most industries planning has disappeared nowadays. Most enterprises produce and sell on the basis of market prices and the desire to get the maximize profits. Energy is one of the few sectors where plan controls still remain. Even in these industries however, only a small proportion of output is produced for the plan, the majority of output is sold at market prices. Most government fixed priced inputs are allocated to defense industries, important infrastructure projects and key heavy industries, such as iron and steel. China's credit plan is still the most important means of allocating capital through the government-controlled banks, and only indirectly affects the fast-growing non-bank, non-governmental financial sectors. While this quantitative control is still in price, credit management is also effected by a managed interest rate regime based on market-determined rates.

2) The pricing system changed to be market-oriented. Before the economic

reform and Open Door Policy were introduced, price of main commodities were decided by central government, and other less-important commodities were virtually set by provincial and local government. Prior to reform price fluctuation existed, but it was not so obvious because many prices remaining fixed at the same level for decades. Prices were not important factor in enterprises operations since almost all of commodities were produced by the government-owned (state-owned) enterprises, and production volumes were decided in accordance with the flow of inputs and outputs within the planning system. The ultimate objective of government-owned enterprises was fulfilling output targets rather than cost efficiency or profitability.

Since the economic reform and Open Door Policy started, the government has carried out price reform step by step, along with the expansion of the commodity market scale and the movement of the balance between supply and demand. The government set new prices for sixing commodity prices as follows:

A. Government fixed prices

B. Government guiding prices

C. Market regulatory prices

The percentage of market regulating prices has been gradually increased. These prices were regulated mainly through the relations between market supply and demand. In accordance with the requirements of the socialist market economy, China has been establishing a pricing mechanism Macro-regulated and controlled by the government, and fixing prices through the market. In order to extend the regulatory function of the market, the government has gradually reduced the categories of products for planned production, eliminated the restriction that enterprises were only allowed to engage in production but not in business operation, and the practice of the government fixing commodity prices.

3) Competition is permitted in industry activities. Competitive activities were

virtually not existed in the market prior to the economic reform. China's industry was dominated by the central government-owned and a rigid regulatory regime. Production and investment by government-owned enterprises were controlled through a system of government authorities, usually the industrial ministries at the central and provincial level. Profits made by government-owned enterprises were surrendered to the government through their governing authorities and investment funds were allocated by the government from the budget. Regional comparative advantage was ignored and regional self-sufficiency became an overriding policy goal. Heavy and military industries were given first priority, but light, consumer goods industries got second priority.

As a result of significant relaxation of government restrictions on the non-governmental sector, competition has increased considerable since 1978. The biggest problem was that industries did not have strong intention to make high quality products and to improve productivity. This must be the main reason why the government decided to set the present economic policy. Entry barriers for domestic and foreign firms to most industries and sectors, with some notable exceptions, have been considerably reduced. Competition in the domestic economy has grown despite the absence of a rigorous bankruptcy mechanism.

1.1.3. Introduction of China's enterprise reform

China's enterprise reforms started from the reform of the incentive mechanisms of the state-owned enterprises (SOE), and then gradually transited to the reform of the ownership structures of the SOEs. This process fell into three successive phases:

In the first phase(1979-1986), the SOE reform focused on enhancing the incentive mechanisms of the SOEs, and the policy measures taken in this period

included "*Fangquan Rangli*"(decentralizing control rights and profits to the enterprise level), "*Ligaishui*" (transforming firm profit extraction into tax submission), and "*Bogaidai*" (transforming fiscal investment into bank credit). Before these SOE reforms, the government had realized that one important drawback of the traditional plan-economy system was the over-control and over-regulation on the SOEs, and the government hence decided to decentralize the control right and profit-sharing down to the enterprise level. And the measure of *Fangquan Rangli* became the distinct feature of this period of China's SOE reforms.

However, due to the lag of corresponding reforms on the macroeconomic system and on the institutional arrangement of resource allocation, and more importantly, due to the various policy burdens on the SOEs (Lin et al, 1997), the price system and allocation system of the economy were still in great distortion, and such distortion made it difficult for the government to depend on external indicators to effectively judge the real performance of the SOEs. Under this condition, information asymmetry between the government and the SOEs would result in serious incentive problems, such as moral hazard and adverse selection, especially when the SOE managers then enjoyed more control rights on the SOEs. In fact, during this period of SOE reforms, though both the total output and the production efficiency of the SOEs were significantly increased, there was no corresponding increase in state revenues, because large parts of the SOE profits were encroached by the SOE managers and workers.

The second round of SOE reforms were carried out in the period of 1987-1992, and it began step into the realm of ownership structure adjusting and "*Chengbaozhi*" (contracting out the SOEs to the SOE managers) became the major policy measure taken in this period. The adoption of *Chengbaozhi* reform was initially enlightened by the success of the Household Responsibility System (HBS) reform in rural areas. And

from 1987 to 1992 two rounds of *Chengbaozhi* reforms were carried through nation-wide. The major form of contracting out the SOEs was "*Liangbao Yigua*": that is, the SOE managers guaranteed certain levels of enterprise profit and tax rendering, as well as certain level of investment in technical innovation, and the total pays to the workers was proportioned to the total enterprise revenue.

The reform of *Chengbaozhi* greatly stimulated the production enthusiasms of the workers and facilitated the rapid growth of public economy, but paradoxically, the ratio of state revenue to GDP reduced significantly in this period. In fact, when there were still great distortions in the economy and when the SOEs still assumed the policy burdens, the problem of information asymmetry could not be effectively alleviated, and hence the benefits of the state would unavoidably be eroded by the self-interested SOE managers.

The third round of SOE reforms commenced in 1992, and from then on the thought of "building up Modern Enterprise Institution (MEI)" has become China's mainstream guideline for China's SOE reforms, especially for the large-sized SOEs. The major features of MEI were summarized by the central government as "clear ownership structure, definitive benefits and responsibilities, insulating SOE operation from government intervention, and scientific management". And in 1993 the Corporate Law was published to guarantee and facilitate the SOE reforms. However, for those problems that could not be solved by the *Chengbaozhi* reform, neither could the MEI reforms. Because an important proposition for the MEI to improve the corporate governance of the SOEs is that there exist open and equally competitive markets of products, professional managers and corporate stocks, and the SOEs do not sustain any policy burdens, both of which are still not realized in China's economy.

1.1.4 Introduction of Chinese stock market and public corporation

The origin of the stock market in post-1949 mainland China can be traced to August, 1984, when Shanghai Municipal Government approved the first provincial-level regulation on securities. The first stock was subsequently issued by a household electronics company in November of the same year and became tradable in August, 1986 on the OTC market run by the Industrial and Commercial Bank of China. In the following years, more SOEs were "incorporated" through selling shares to their employees and other stock companies and SOEs. However, the stockholding system did not become a significant vehicle for ownership reform of SOEs until the establishment of the Shanghai Stock Exchange (SHSE) in 1990. The Chinese Security Regulatory Commission (CSRC) was set up in the following year as the Chinese equivalent of the Securities and Exchange Commission in the United States to monitor and regulate the stock market. Since then, the Chinese stock market has grown rapidly. As of the end of June, 2005, 1391 companies were listed in the Shanghai Stock Exchange and Shenzhen Stock Exchange with a total market capitalization of 3159 billion Yuan.

Because the stockholding system is a rather recent development in China, the ownership structure of listed Chinese companies has some unique features not found in stock markets of more developed economies. The shares are classified as A-shares designated for domestic investors and B-, H- and N-shares designated for overseas investors. A-shares are further divided into state shares, legal-person shares, tradable A-shares, and employee shares. State shares are those owned by the state, i.e., the central government and local governments. Legal-person shares are those held by domestic legal entities and institutions such as other stock companies, state-private mixed enterprises, and non-bank financial institutions. Both state shares and legal-person shares are not tradable on the stock exchanges, but the latter can be sold to other legal persons. Tradable A-shares, which can only be held by Chinese citizens

and institutions, are the only class of share that can be traded among domestic investors. B-, H- and N-shares are those that can only be held and traded by foreign investors. The market for B-shares is separated from the A-share market. They are denominated in U.S. dollars on the SHSE and in Hong Kong dollars on the Shenzhen Stock Exchange. H- and N-shares are similar to B-share in nature, except that they are listed and traded on the Hong Kong Stock Exchange and the New York Stock Exchange, respectively. Employee shares are a unique feature of the Chinese stockholding system and different from an employee stock ownership plan in the United States. They represent accumulated profits retained by the pre-initial-public-offering entity under the Contract Responsibility System and are collectively owned by the employees of the company. They are not tradable at the time of listing and are managed by either an investment management committee or a staff union. Because most listed firms do not have employee shares and they typically account for a very small fraction of total shares outstanding when they exist, we exclude employee shares from our empirical analysis in this paper. In general, the management owns none or very little shares.

Currently, a typical listed Chinese firm has a mixed ownership structure. As is shown in Fig. 1.1, the state is the biggest shareholders of Chinese publicly listed companies. The legal persons and domestic individual investors are the next dominant groups of stockholders. Many listed firms do not have employee and foreign shares, and even if they do, these shares on average consist of less than 10 percent of total shares outstanding when combined. Restructuring to be public corporation is one of the most important directions of Chinese SOE reform. Publicly listed companies are the best portion of Chinese public corporations. However, as can be seen from Table 1.1, their performance is still not satisfied.

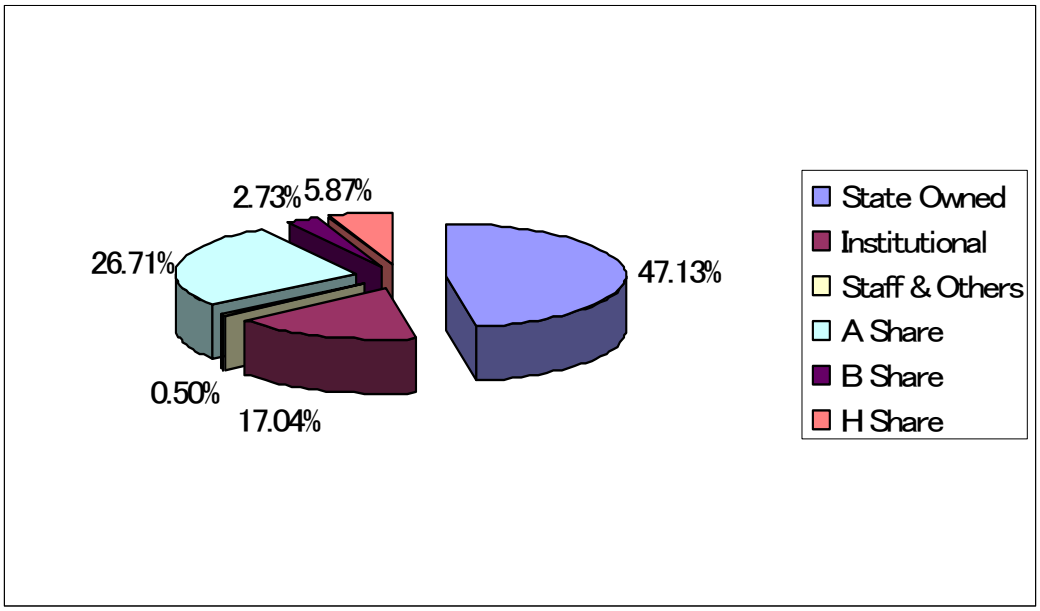


Fig.1.1 Ownership Structure of Chinese Publicly Listed Corporations

(Source: China Securities and Futures Yearbook, 2005

Year	1993	1994	1995	1996	1997
Average EPS	0.36	0.31	0.25	0.23	0.24
Average ROE(%)	14.68	13.15	10.78	9.59	9.69
Loss Makers	-	2	17	31	41
Loss Maker Ratio (%)	-	0.68	5.26	5.58	5.5
Average Value of Losses (Million Yuan)	-	1.83	2.14	3.97	6.18
Year	1998	1999	2000	2001	2002
Average EPS	0.19	0.2	0.2	0.13	0.14
Average ROE(%)	7.45	8.23	7.63	5.35	5.65
Loss Makers	77	79	97	151	152
Loss Maker Ratio (%)	9.16	8.32	8.7	12.87	12.84
Average Value of Losses (Million Yuan)	16.57	10.33	16.58	26.12	12.5

Table 1.1 Performance of Chinese Publicly List Companies

(Source: China Securities and Futures Yearbook, 2003)

1.1.5 Introduction of China's international trade and inward FDI

Prior to 1978, China aimed at self-sufficiency, importing only those goods it could not locally produce and exporting goods only to pay for essential imports. Trade was monopolized by 12 Foreign Trade Corporations, which were controlled by the central government ministries, and other trades were not permitted. Export and import plans covered virtually all foreign trade, applying to around 3,000 commodities. Exports were compulsorily produced at government controlled prices by the Foreign Trade Corporations under the foreign trade plan. Similarly, import commodities were sold to domestic firms and consumers at government controlled prices. Trade was therefore only a small proportion of the economy.

China's Open Door Policy has dramatically changed the autarkical policy existed in pre-1978, and aggressively accepting foreign investment and trade. As a result, imports and exports are increasingly led by the market forces and industrial comparativeness. The Ratio of imports and exports to GDP is now 42% and China is now the tenth biggest trading country in the world. The non-governmental sectors are particularly export-oriented. In fact much of China's trade is now being conducted by foreign funded enterprises, and foreign funded enterprises can automatically trade on their own account. The highly market-oriented township and village enterprises are also conducting a growing proposition of China's trade. Aside from the central government control, a number of other schemes are employed by the government to manage the trade regime. These schemes include tariffs, licenses and quotas, restricted trading rights, subsidies and foreign exchange controls. Nearly half of China's total trade flows operate under a very liberal set of policy conditions.

FDI inflows into China have increased rapidly over the last two decades. Before 1979, FDI was prohibited in China, a restriction which was lifted following the

adoption of China's open door policy in 1979, when a new foreign investment law was adopted. In its early stages, FDI was restricted to China's Four Special Economic Zones and limited to equity joint ventures. Most of the FDI went into hotel construction and energy extraction. In 1984, a new foreign investment law was adopted to accelerate FDI growth and a number of preferential policies were used by both central and local governments to attract FDI. A sharp increase occurred after 1992 when China reaffirmed policies of openness and market-oriented reforms introduced earlier.

As Fig.1-2 indicates, growth in China's inward FDI has been spectacular. In 1985, annual FDI inflows were less than US$ 2 billion; while in 2004, they were US$ 61 billion, 30 times those of 20 years earlier. Between 1985 and 1991, the annual growth rate of FDI inflows into China was 14%, and annual FDI inflows during this period remained less than US$ 4.5 billion. FDI inflows increased sharply to US$ 11 billion in 1992 and again to US$ 28 billion in 1993, with growth rates of over 150% in both years.

By 1997, China had FDI inflows of US$ 49 billion. Although the late 1990s saw a small decrease in FDI inflows, the annual growth rate of FDI inflows into China increased again to over 10% after China joined the WTO in 2001. During the three years 2001, 2002 and 2003, world FDI inflows declined sharply by 41%, 13% and 12% respectively (UNCTAD, 2005), but China registered FDI growth of 15%, 13% and 1.4% (NBSC, 2004).Global FDI inflows increased only 2% in 2004, while China registered an inward FDI growth rate of 13% (NBSC, 2005). China's share of FDI flows has thus increased sharply in recent years. China is now the world's largest developing country FDI recipient and the world's 2nd largest FDI recipient overall after the US. By way of contrast, FDI inflows into India were only US$5 billion in 2004.

China's FDI inflows fall into two broad categories. One is horizontal FDI involving the transfer of production from abroad to China to service the Chinese internal market. The other is vertical FDI which seeks to take advantage of low cost production (and especially low wage rates) for export of products abroad. Most export-oriented FDI inflows originate from other Asia economies, including South Korea, Taiwan, and Hong Kong, and are in the vertical category which seeks to exploit low production costs. FDI flows from North America and Western Europe are more heavily in the horizontal category, which seeks to exploit the Chinese domestic market. U.S. origin FIEs sold more than 80% of their products locally in China in 2002 according to Fung (2004). Japan lies between these two groups, with 45% of production for China's domestic market.

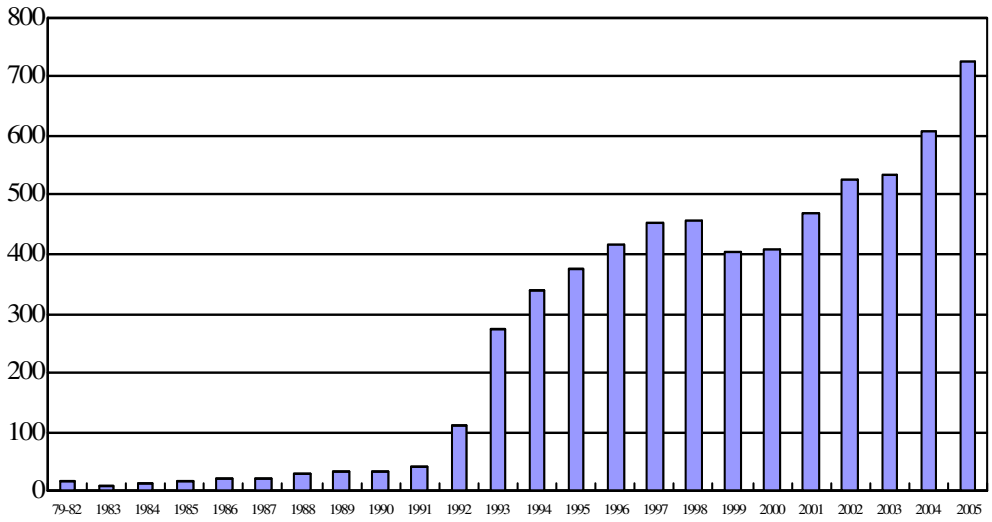


Fig1-2 FDI in China from 1979 to 2005

(Source: collected from statistical data of Ministry of Commerce of China)

Before 2002, FDI from Asian neighbors, especially from HMT (Hong Kong, Macau and Taiwan), dominated FDI flows into China. As Figure 2 indicates, FDI from HMT alone accounted for 66% of total FDI inflows between 1979 and 1992, and

55% between 1993 and 2001. After 2002, the sources of China's FDI inflows became more diversified with U.S and other OECD countries accounting for an increasing share. HMT's share in total inward FDI has steadily declined to around 40% today.

Before China's accession to WTO, less than 60% of inward FDI went to the manufacturing sector. But after China joined the WTO, more inward FDI went to the manufacturing sector and its share reached over 70% as the share of FDI going to the real estate sector decreased sharply. In agriculture, before China joined the WTO, only 1% of accumulated FDI went to this sector, but in recent years the agricultural share of new FDI increased to 2%.

As a result of these FDI inflows, by 2004 500 thousand FIEs had been established in China although only around 50% of them were still operating. Among the 242 thousand functioning FIEs, 160 thousand were industrial enterprises. Only 43 thousand FIEs with annual sales income of over 5 million Yuan (0.61 US$ million equivalent) are tracked by statistical agencies in China for data purposes.

1.1.6 Science and technology in China

China's economic reforms have transformed the country's institutions that govern the incentive to innovate. Under China's pre-reform innovation system, state patronage shaped the allocation of innovation resources. In lieu of private pecuniary incentives, the Government employed official recognition and professional prestige and advancement to motivate research focus in certain limited areas. Such a system was effective in supporting basic research, where albeit the private returns were low, the social returns and hence the attention and accolades of the Government were high. However such a system was ill defined to calibrate the complex incentive structure required for a broad-based system of commercial innovation that could effectively

respond to the needs of the producer and consumer sectors that lay outside the immediate realm of the government's S&T priorities.

Enterprise reform and ownership restructuring has reestablished the profit motive and competition interplay to the innovation process. Enactment of the patent law in 1984 and the copyright law in 1990 signified the introduction of market-based incentives to China's national innovation system. A hybrid system has now emerged that consists of both state-led S&T initiatives and market-based institutions. The role of state patronage has largely been restructured to complement the market based incentive structure.

Fig. 1-3 below illustrates and expands upon the widely observed pattern of a shift in funding of S&T activity from the government to the firm sector. It shows not only the rising share of the enterprise sector in funding S&T, Fig.1-3 also shows the small and declining share of government-financed S&T in the important industrial LME sector, which accounts for nearly 42 percent of China's total S&T spending. While the government's share of S&T funding in the LME sector has fallen to just four percent, the enterprise share in 2002 rose to over 84 percent. The erosion of the industrial LME and government funding shares in total S&T spending suggest that S&T financing is shifting toward smaller enterprises, most of which are non-state enterprises, and independent research institutes. The continuing restructuring of the research institute sector entailing its closer alignment with enterprise sector and its increasing reliance on its self-finance is also strengthening the incentive for commercial innovation.

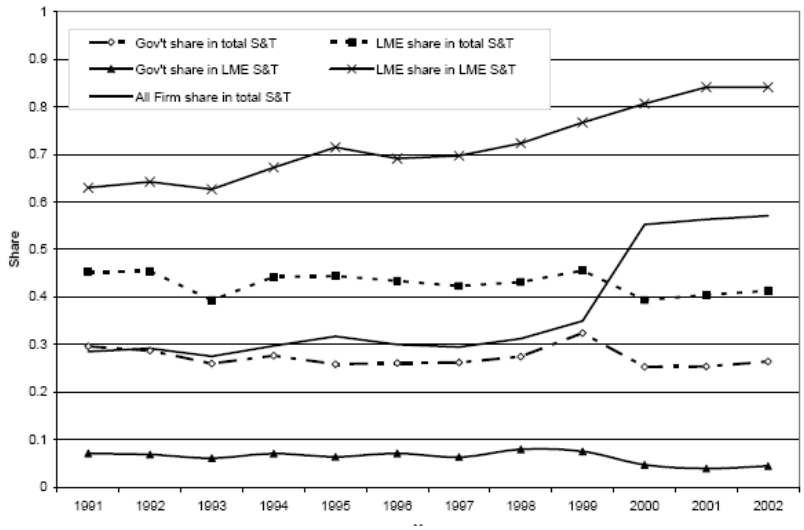


Fig. 1-3 The Roles of State and Enterprises in S&T Funding

Source: China Statistical Yearbook on Science and Technology (2003)

China's National People's Congress passed China's first patent law in 1984. The substantial revision of the patent law in 1992 expanded in general the scope of patent protection. The impact of stronger patent protection is clearly reflected in the annual patent grants plotted in Fig. 1-4. On the other hand, Fig.1-4 also shows that the surge in patenting is driven by "utility" and "design" patents, which represent incremental innovations and receive far weaker legal protection than that afforded by "invention" patents. Moreover, from Fig. 1-5, it is obvious that despite being dwarfed by domestic inventors in total patent grants, foreign inventors have taken out more invention patents than their domestic counterparts. Foreign invention patents' dramatic jump of seven fold from 1997 to 2002 is synchronized with the surge in domestic and overall patenting.

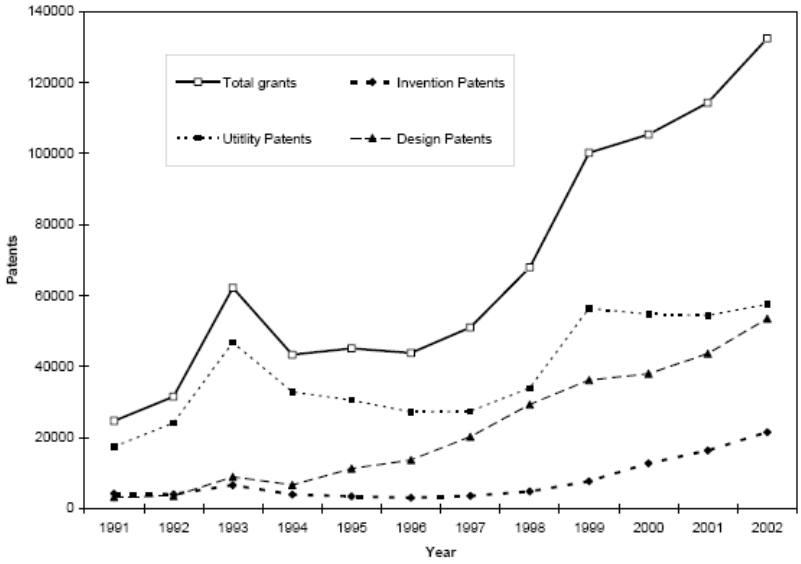


Fig. 1-4 Patents and Scientific Papers

Source: China Statistical Yearbook on Science and Technology (2003)

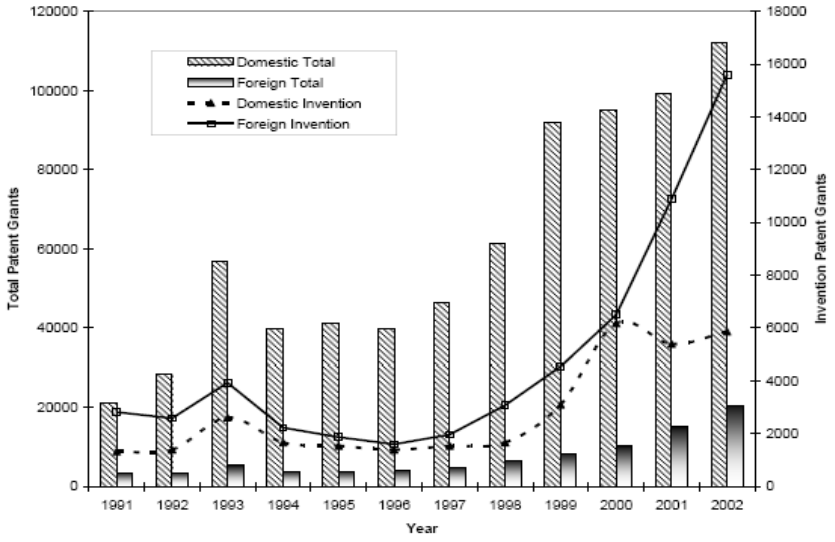


Fig. 1-5 Domestic vs. Foreign Patent Grants

Source: China Statistical Yearbook on Science and Technology (2003)

1.2 Research Purpose

The background introduction indicates that Chinese industries have been grown rapidly in the background of the open market policy since 1980's. China is becoming the world plant. The new round of industry restructuring brought about by economic globalization provides an opportunity for China to become a strong player in the manufacturing sector. The traditional manufacturing industry is weighed down with former SOEs. With low production efficiency, overstaffing, poor innovation capability and outdated production process, enterprises in this sector face increasingly grim competition environment after China joined the WTO. At present, the development of China advanced manufacturing industry is in full swing. The central government, local governments and enterprises embarked on the renovation process of manufacturing in light of the actualities and their own needs.

Generally speaking, Chinese economy has depended on labor-intensive and export-oriented strategy for a long time. Most of Chinese enterprises are accustomed to a dominant strategy of labor cost advantage. However, with the evolution of globalization and international industrial transfer, the advantage is gradually diminishing because there are many other developing countries growing up, such as Thailand, Vietnam and other countries in Southeast Asia. Chinese industries have been inevitably experiencing extensive industrial paradigm-shift. So, it is time for Chinese industries to take a new strategy to create innovation capacities to adapt to the industrial paradigm-shifts and to compete with other countries. To create innovation capacities, Chinese enterprises need to change their organization, system, and technology strategies.

In this study, Chinese firms' organizational learning in industrial paradigm-shift is focused on and taken into account. The research is based on a viewpoint that

Chinese companies had accumulated knowledge for productivity through imitation and late-comer advantages and that they need to create knowledge for innovation at the coming stage. In the "Knowledge Society" era, facing the opportunity and challenge of economic globalization, it is critical for Chinese firms to accumulate and create new knowledge, to adjust their business strategy and to prepare innovation capacities for the future development, because knowledge and competence are increasingly regarded as the most critical resources of firms and economies (Drucker, 1993; Quinn, 1992; Reich, 1992). However, each firm has its unique organization characteristics and developing trajectory. On the other hand, the knowledge of firms is socially embedded. It is rooted in organizational coordination mechanisms and routines which, in turn, are heavily influenced by societal institutions. Therefore, firms depend differentially on different knowledge types and adopt different approaches to learning. The relative importance of tacit vs. explicit knowledge and their role in learning and innovation can vary greatly between firms in different societal contexts. The question is that how can Chinese enterprises obtain business success under such circumstances through effective organizational learning.

In this research, we are aiming to find, observe and analyze successful Chinese enterprises based on case study, focusing on their organizational learning manner in the background of economic transition and industrial paradigm-shift. Concretely, the purpose of the research is to depict the case companies' organizational learning manner and process from the perspective of knowledge accumulation, transfer and creation, to expound the internal and external factors of their success, and at the same time, through careful analysis, to find out some implications about effective organizational learning in industrial paradigm-shift. These implications from success experience may be helpful and suggestive for the future development of Chinese enterprises.

1.3 Object of the Research

Based on field study, we found two typical successful enterprises in China, whose success owes much to their effective organizational learning. By direct interviewing to the managers and related staffs and collecting detailed data through publicly available sources, such as company prospectus, annual reports, reports from investment analysts, and the web site of the companies, the following research on these two enterprises in China was established.

Case Company 1 is a logistics company of long history, which was restructured from a former state-owned company to a public corporation. In order to match fast business extension, the company tries to make use of some traditional social culture to educate its new employees, to foster its own talents and to maintain its brand fame. At the outset, the company focused on formal education and training in order to enrich the knowledge base for establishing smooth operation routines. Then the company utilized some of its historical heritages, such as “Youth League” to reinforce human networks favorable for group learning and intercommunications between individuals. This enhances employee value and organization efficiency. Up to date, the company is quite successful in their business, because many professional talents have been fostered through their effective organizational learning.

Case Company 2 is an electronics company founded in 1980s as a Sino-foreign joint venture. The history of the enterprise was roughly classified to the following three parts: 1) Catching up through OEM manufacturing in 1980s, 2) Self-branding by digital era in 1990s, 3) Advancing own technology by R&D in 2000s. On different developing stages, the company tried to execute proactive organizational learning through borderless technology spillovers in the collaborations with multinational enterprises (MNE). There are two stages in the learning process. One is learning

through imitation, while the other is learning through co-research. The two learning stages present different characteristics. On the other hand, the company attached great importance to flexible group learning, such as QC (Quality Control) teams. In this way, the company has developed to be a technology-driven, manufacturing company with relatively high innovation capacities.

1.4 Framework of the Thesis

The thesis is arranged as follows: (See Fig. 1-3)

Chapter 1 introduces the background of this research and research purpose. A brief introduction of Chinese transition economy and the current status of public corporations are also traced in detail

Chapter 2 presents a brief literature review of organizational learning, knowledge management, social capital and borderless technology spillovers.

Chapter 3 puts forwards research questions, object selection and a framework of analysis.

Chapter 4 describes in detail the case of a logistics company, mainly focus its organizational learning through human networks. An analysis of the case is followed after the case introduction.

Chapter 5 is another case study of an electronics company. A detailed description of the case company's learning through MNEs' technology spillovers and an analysis are included.

Chapter 6 provides a discussion about the above-mentioned case on the basis of a comparison study. Three viewpoints are focused in the discussion: 1) organizational learning outside the enterprises, 2) organizational learning inside the enterprise, and 3) timing of learning.

The thesis ends in conclusions, implications and future study.

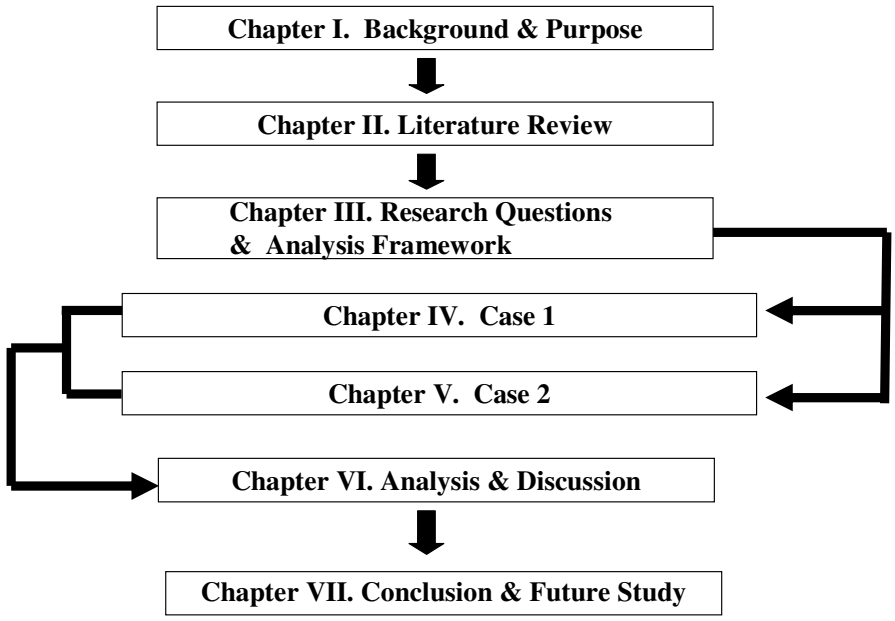


Fig. 1-6 Framework of the Thesis

Chapter 2 Literature Review

2.1 Knowledge and Knowledge Creation

2.1.1 Two dimensions of knowledge: explicit knowledge and tacit knowledge

Knowledge is delineated as two dimensions: explicit knowledge and tacit knowledge (Polanyi, 1966, Nonaka, 1995). Explicit knowledge can be codified and transmitted in formal, systematic language, such as in the form of books, technical specifications, product blueprints, or as embodied in machines. Tacit knowledge, in contrast, is so deeply rooted in the human mind and is difficult to codify and transfer in formal language between individuals and organizations. Tacit knowledge can only be acquired through experience such as observation, imitation and practice.

Human knowledge exists in different forms. It can be articulated explicitly or manifested implicitly (tacit). The critical differences between these two forms lie in three major areas. First, its codification and mechanisms for transfer. Explicit knowledge is also codified knowledge. It is that part of human knowledge that can be specified or communicated verbally, or in symbolic forms such as written documents, blueprints or computer programs. It belongs to Popper's (1972) "World three" knowledge: it can be abstracted and stored in the "objective world", and understood and shared without a "knowing subject". Ease of communication and transfer is its fundamental property. Tacit knowledge, in contrast, refers to knowledge that is intuitive, unarticulated and that cannot be easily codified and transferred. It resides in Popper's "World two" where knowledge cannot be communicated, understood or used without the "knowing subject". Hence, tacit knowledge is also "subjective knowledge". The notion of "tacit knowledge" was first expounded by Polanyi (1962).

Based on the simple observation, “We know more than we can tell”, Polanyi argued that a large part of human knowledge is occupied by knowledge that cannot be articulated. This is particularly true in the case of operational skills or know-how acquired through practical experience. It is action oriented and has a personal quality that makes it difficult to formalize or communicate. Since tacit knowledge cannot be specified in detail and is revealed through practice, it cannot be transmitted by prescription. It can be transferred only by example or observation, such as from master to apprentice. This restricts the range of diffusion to personal contacts. Unlike explicit knowledge which can be formulated, abstracted and transferred across time and space independently of the knowing subjects, the transfer of tacit knowledge requires close interaction and the build up of shared understanding and trust among them.

Second, the main methods for the acquisition and accumulation of the above two knowledge forms also differ greatly. Explicit knowledge can be generated through logical deduction and acquired by formal study. Tacit knowledge, because it is based on experience and bodily action, can only be acquired through practical experience in the relevant context, i.e. “learning-by-doing”. Moreover, as noted by Nonaka (1994: 21-2), the “variety” of experience and the individual’s commitment and involvement in the “context” are critical factors in determining the generation and accumulation of tacit knowledge.

Third, the two different forms of knowledge differ in their potential for aggregation and modes of appropriation. Since explicit knowledge can be easily codified, it can be aggregated at a single location, stored in objective forms and appropriated without the participation of the knowing subject. Tacit knowledge, in contrast, is personal and contextual. It is distributive knowledge that cannot be easily aggregated and stored in objective forms; it can only be appropriated through direct

application. The realization of its full potential requires the close involvement and cooperation of the knowing subject.

Although it is possible to make a conceptual distinction between explicit and tacit knowledge, they are not separate and discrete in practice. Explicit and tacit knowledge are mutually constituted. Nonaka and Takeuchi (1995) argue that new knowledge is generated through the dynamic interaction and combination of these two types of knowledge. In a similar vein, Nelson's and Winter's (1982) evolutionary theory of the firm assumes that the firm provides a special context in which the explicit and tacit modes of knowledge are selected by interaction with the external economic reality and then stored in organizational routines. Over time the quality of the interaction of the explicit and evolving tacit types of knowledge may lead to superior firm performance. However, firms can differ in their capacity for fostering the interaction between these two different knowledge types, and their relative importance and status may also differ.

Despite the contemporary trend towards knowledge codification and the growth in the body of "scientific" knowledge, tacit knowledge will always remain an important component in all productive and innovation activities. The inherently tacit nature of a large part of human knowledge means that there are natural limits to codification. Knowledge that can be expressed in words and symbols represents only the tip of the iceberg of the entire body of possible knowledge. Codification inevitably involves a data sacrifice; some part of the knowledge will always stay behind in the minds of the knowing subject. More importantly, the creation of new knowledge in itself will necessarily involve the use and generation of tacit knowledge. Polanyi (1962; 1966) sees the origin of all human knowledge in individual intuition. He argues that scientific creativity stems primarily from deep immersion in the phenomenon to be explained, for that alone gives rise to intuitions about how to begin

the interaction. For Polanyi, science is a process of explicating the tacit intuitive understanding that underlies the subconscious learning of the focused scientist. In a similar vein, Nonaka and Takeuchi (1995) argue that the key to organizational knowledge creation lies in the mobilization and conversion of individual tacit knowledge into collective knowledge. The learning and innovative capability of an organization is thus critically dependent on its capacity to mobilize tacit knowledge and foster its interaction with explicit knowledge.

2.1.2 Knowledge creation process

According to Nonaka (2000), knowledge creation is a continuous, self-transcending process through which one transcends the boundary of the old self into a new self by acquiring a new context, a new view of the world, and new knowledge. One also transcends the boundary between self and other, as knowledge is created through the interactions among individuals or between individuals and their environment.

Knowledge creation is depicted as a spiral process of four modes of conversion between the two dimensions of knowledge (Nonaka, 1994, Nonaka and Takeuchi, 1995). The four modes of knowledge conversions are: (1) socialization (from tacit knowledge to tacit knowledge); (2) externalization (from tacit knowledge to explicit knowledge); (3) combination (from explicit knowledge to explicit knowledge); (4) internalization (from explicit knowledge to tacit knowledge). Following *Nonaka,* these processes can be conceptualized as a knowledge spiral i.e., as a dynamic transformation-process between explicit and tacit knowledge on the different layers.

1) *Socialization* is the process of converting new tacit knowledge through shared experience. It comprises the exchange of tacit knowledge between individuals in order

to convey personal knowledge and experience. Joint experience results in new shared implicit knowledge, such as common values or technical skills. In practice, this could mean, for instance, gaining intuitive and personal knowledge through physical proximity and attaining direct communication with customers or a supplier.

2) *Externalization* describes transformation processes. It is the process of articulating tacit knowledge into explicit knowledge. On the one hand, this means the conversion of implicit into explicit knowledge, and on the other, the exchange of knowledge between individuals and a group. Since implicit knowledge is difficult to express, the conversion process is often supported by the use of metaphors, analogies, language rich in imagery, or stories, as well as visualization aids, like models, diagrams or prototypes. In order to stage a constructive discussion and reach creative conclusions, a deductive or inductive mode of argumentation is also very important.

3) *Combination* (recently *Nonaka* renamed this stage *Systematization*, Nonaka 1999) is the process of transforming explicit knowledge into more complex and more systematized explicit knowledge represents the stage. It is necessary to combine different fields of explicit knowledge with each other and make new knowledge available on an organization-wide basis. The systematization and refinement increases the practical value of existing knowledge and increases its transferability to all organizational units.

4) *Internalization* is the process of embodying explicit knowledge into tacit knowledge. It comprises the conversion of organization-wide, explicit knowledge into the implicit knowledge of the individual. This requires from the individual that she/he should be able to recognize personally relevant knowledge within the organization. Continuous learning and the gathering of one’s own experience through "learning-by-doing" may support employees in these internalization processes. In this way, capabilities and skills ("know-how") as well as firm visions and guidelines may

be internalized and therefore shared throughout the whole company. This tacit knowledge and the experience gained on an individual level can be shared again through socialization-processes between individuals, so that the knowledge spiral may be set in motion once more.

Nonaka also suggested that knowledge needs a physical context to be created, while “Ba” offers such a context. More concretely, social, cultural and historical contexts provide the basis for individuals to interpret information to create meaning, so “Ba” is the key in the process of knowledge creation to provide the energy, quality and place to perform the individual conversions and to move along the knowledge spiral.

Originated from the Japanese philosopher Kitaro Nishida and further developed by Shimizu, Nonaka describes four types of “Ba” defined by two dimension of inter actions: the type of interactions and the media in such interactions. Each of the types of “Ba” offers a context for a specific step in the knowledge creation process. The four types of “Ba” are:

1) Originating Ba mainly offers a context for socialization. It is a place for individuals to share experiences, feelings, emotions and mental models through face-to-face interactions.

2) Dialoguing Ba mainly offers a context for externalization. It is a place defined by collective and face-to-face interactions, where individuals’ mental models and skills are shared, converted into common terms, and articulated as concepts.

3) Systemizing Ba mainly offers a context for the combination of existing explicit knowledge. It is defined by collective and virtual interactions. Information technology offers a virtual collaborative environment for the creation of systemizing Ba.

4) Exercising Ba mainly offers a context for internalization. It is defined by

individual and virtual interactions, where individuals embody explicit knowledge that is communicated through virtual media, such as written manuals or simulation programs.

The schematic illustration of knowledge creation process, four types of Ba and the respective relations between each single Ba and conversion modes is indicted in Fig. 2-1.

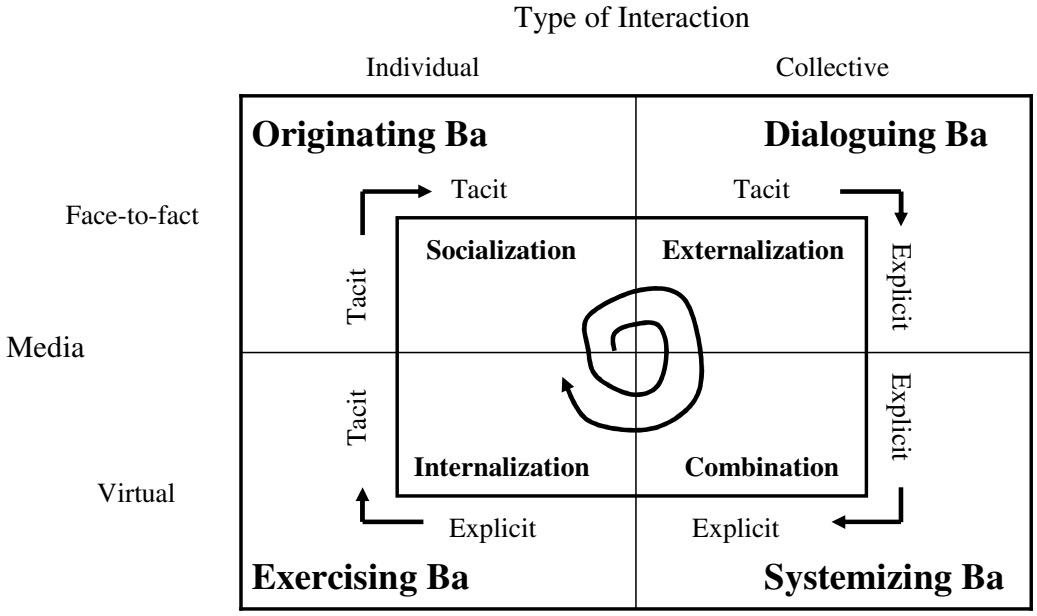


Fig. 2-1 SECI Model and Four Types of Ba

2.2 Organizational Learning

Organizational learning is a function of an organization's absorptive capability, which is the capability to recognize valuable new knowledge, integrate it into the organization and use it productively (Lane and Lubatkin, 1998). Organizational learning takes place at both the individual level and the organizational level. Individuals within the organization are the prime actors in the process of organizational learning. Organizational learning is not, however, the simple sum of

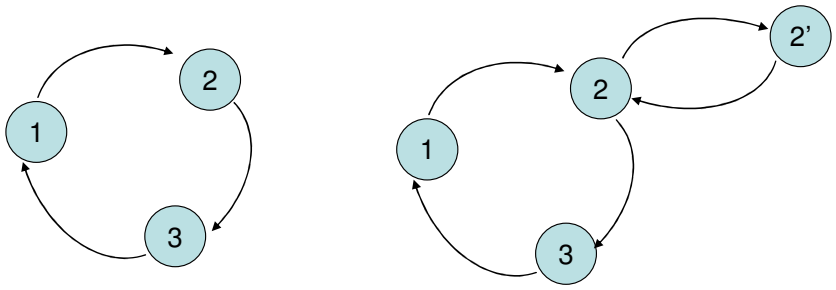
individual learning (Hedberg, 1981); rather, it is the process whereby knowledge is created, is distributed across the organization, is communicated among organization members, has consensual validity, and is integrated into the strategy and management of the organization (Duncan and Weiss, 1979). Organizations learn only when individual insights and skills become embodied in organizational routines, practices and beliefs (Attewell, 1992). Only effective organizations can translate individual learning into organizational learning (e.g. Shrivastava, 1983). All organizations are learning systems. Organizational factors (intention, autonomy, fluctuation and creative chaos, redundancy, requisite variety and leadership) affect formal and informal processes and structures that facilitate organizational learning (Nonaka and Takeuchi, 1995).

2.2.1 Three-fold typology of learning developed by Agyris and Schon (1978)

A number of studies into learning from a management studies perspective distinguish various types and levels of learning. For example, Foil and Lyles (1985) distinguish higher and lower level learning. Senge (1990) differentiates generative from adaptive learning. Dodgson (1990) separates strategic from tactic learning. From an organization theory perspective, Agyris and Schon (1978) develop a three-fold typology of learning which they describe as single-loop, double-loop and deutero-learning.

1) *Single-loop learning:* is an error-detection-and-correction process. According to Argyris and Schon, organizational learning involves the detection and correction of error. As shown in Fig. 2-2, Single-loop learning occurs when the error detected and corrected permits the organization to carry on its present policies or achieve its present objectives.

2) *Double-loop Learning* occurs when error is detected and corrected in ways that involve the modification of an organization's underlying norms, policies and objectives. (See Fig. 2-2)



Single-loop Learning **Double-loop Learning**

1. Cognition and monitoring of environment changes
2. Comparing corporate criterion and target to information obtained
2' reflection of the correctness of corporate criterions and targets
3. Improvement of behaviors

Fig. 2-2 Single-loop Learning & Double-loop Learning

3) *Deutero-learning* means organization learn how to carry out single- and double-loop learning. When an organization engages in deuteron-learning, its members learn about previous contexts for learning. They reflect on and inquire into previous episodes of organizational learning, or failure to learn. They discover what they did that facilitated or inhibited learning, they invent new strategy for learning, they produce these strategies, and they evaluate and generalize what they have produced.

According to Agyris and Schon's model, the process of organizational learning can be divided into four stages: discovery, invention, production and generalization. (See fig. 2-3) In the first two stages, organizations focus on single-loop learning. In the production and generalization stages, double-loop learning happens. With the

production and generalization of new methods, organizations modify their norms, policies and objectives. Hence, such learning creates innovation.

Fig.2-3 Agyris and Schon's Organizational Learning Process

2.2.2 Crossan et al.'s 4I framework of organizational learning

Crossan et al. see organizational learning as the process of change in thought and action – both individual and shared – embedded in and affected by the institutions of the organization. The basic challenge of organizational learning, they argue, is the tension between assimilating new learning (exploration) and using what has been learned (exploitation). Managing the tension between novelty and continuity is critical for firms strategic renewal (March, 1991), positioning organizational learning as a fundamental strategic process and the principal means of achieving strategic renewal.

Incorporating a multilevel view of learning, the 4I framework disentangles the processes through which learning occurs in firms. As shown in Fig. 2-4, learning occurs at the individual, group and organization levels, each informing the others. These three levels of learning are linked by four social and psychological processes:

intuiting, interpreting, integrating and institutionalizing. Within these processes, cognition affects behavior, and vice versa.

1) Intuiting is a subconscious process that occurs at the level of the individual. It is the start of learning and must happen in a single mind.

2) Interpreting then picks up on the conscious elements of this individual learning and shares it at the group level.

3) Integrating follows to change collective understanding at the group level and bridges to the level of the whole organization.

4) Institutionalizing incorporates that learning across the organization by imbedding it in its systems, structures, routines and practices.

As shown in Fig. 2-4, the distinction between stocks and flows of learning within an organization. Learning stocks reside within each level (individual, group, and organization) and comprise the inputs and outputs of learning processes. In contrast, learning flows are the processes through which learning moves from one level to another. The feed-forward flow moves from the individual and group to the organization through the 4I learning processes: intuiting-interpreting, interpreting-integrating, and integrating-institutionalizing. At the same time, an analogous flow feeds back from the organization to the individual and group, forming a new variation of processes: institutionalizing-integrating, integrating-interpreting, interpreting-intuiting, and institutionalizing-intuiting. The tension between the feed-forward and the feedback flows of learning represents the tension between exploration and exploitation (March, 1991). The feed-forward process allows the firm to innovate and renew. The feedback process reinforces what the firm has already learned and ensures that organization-level repositories of knowledge (such as culture, structures, systems, procedures, and strategy) guide individual and group learning.

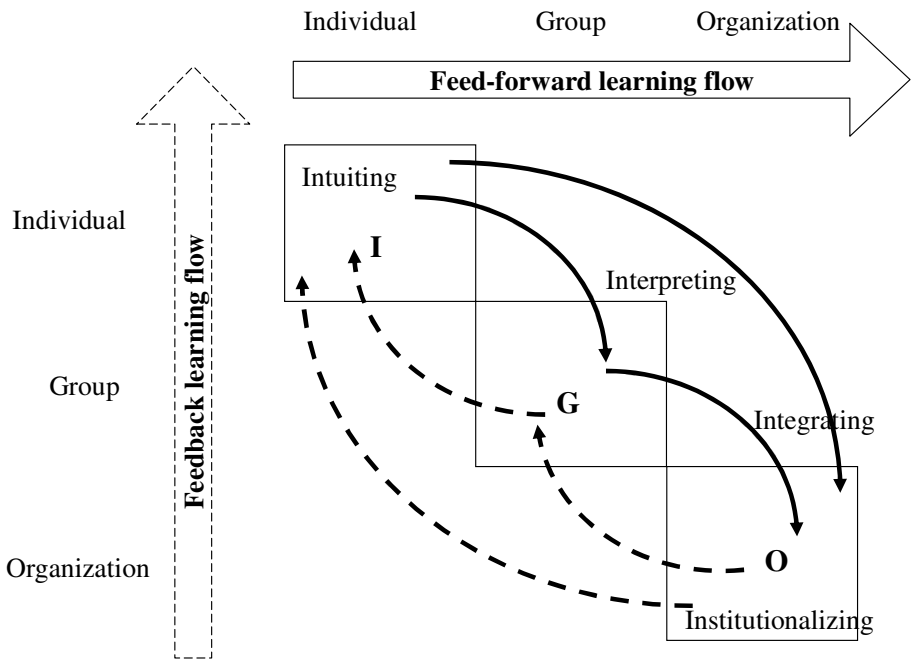


Fig. 2-4 4I Framework of Organizational Learning (Crossan et al., 1999)

I	**Individual learning stock:** Individual competence, capability, and motivation to undertake the required task
G	**Group learning stock:** Group dynamics and the development of shared understanding
O	**Organizational learning stock:** Alignment between the nonhuman storehouse of learning, including systems, structures, strategy, procedures and culture, given the competitive environment
→	**Feed-forward learning flow:** Whether and how individual learning feeds forward into group learning and learning at the organizational level (e.g. Changes to structure, systems, products strategy, procedures, culture)
◄····	**Feedback learning flow:** Whether and how learning that is embedded in the organization (e.g. systems, structure, strategy) affects individual and group learning

2.3 Knowledge, Learning and social capital

2.3.1 Social capital and organizational learning

Theory of knowledge and organizational learning (e.g. Polanyi, 1962, 1966, Nelson and Winter, 1982, Spender, 1996a, 1996b, and Nonaka, 1994) seeks to understand the nature of knowledge and organizational learning from a pluralistic epistemological perspective. It makes a distinction between explicit and tacit types of knowledge and argues that the interaction between these two modes of knowing is vital for the creation of new knowledge. Their emphasis on the importance of tacit knowing as the origin of human knowledge indicates the social and interactive nature of knowledge and learning. The resource- or knowledge-based theory (e.g. Penrose, 1959) sees the firm as a body of knowledge residing in its structures of coordination and organizing principles, which in turn, defines the social context for cooperation, communication and learning (Nelson and Winter, 1982; Kogut and Zander, 1992; 1996; Fransman, 1995). At the heart of this theory is the idea that the primary role of the firm and the essence of organizational capability is the integration and creation of knowledge (Spender, 1996a; Grant, 1996; Tsoukas, 1996). Differences in the organizing principles of firms thus can be seen as reflecting their differing knowledge base and learning capabilities. The 'societal effect' approach, associated particularly with the work of the 'Aix group' (Maurice et. al., 1986; Sorge et. al., 1986; Maurice, 1995), demonstrates how external societal institutions interact with internal organizational structures and processes to generate societally distinctive organizational forms. Literature on 'national innovation systems', most notably the work of Freeman (1987; 1995), Lundvall (1992) and Nelson (1993), seeks to understand the link between national institutions, primarily at the macro-level, to the

innovative performance of firms and economies. These two approaches both underline the 'specificity' and 'interconnectedness' of national institutions bearing on industrial innovation.

2.3.2 Porter's cluster theory about knowledge, social network and innovation

Among numerous researches and theories on the contributions of social capital to organizational learning and knowledge management, Michael Porter's cluster theory is outstanding and significant.

Porter defines a cluster as "a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities" (1998). They include concentrations of interconnected companies, service providers, suppliers of specialized inputs to the production process, customers, manufacturers of related products and finally governmental and other institutions, such as national laboratories, universities, vocational training institutions, trade associations and collaborative research institutes. The existence of clusters, or more precisely, the tendency of firms engaged in related fields of economic activity to cluster across a range of industrial sectors, suggests that some of the key factors that determine competitive advantage lie outside the boundaries of individual firms.

According to Porter, the significance of industrial clusters resides in the interactions between four sets of factors that constitute a "competitive diamond": firm strategy, structure and rivalry; factor input conditions; demand conditions; and related and supporting industries (see Fig. 2-5). The more developed and intense the interactions between these four sets of factors, the greater will be the productivity of the firms concerned.

Porter provides a compelling analysis of the way in which the existence of

clusters affects competition:

1) by increasing the productivity of their constituent firms and industries;

2) by improving the capacity of the member firms to innovate and thus enhancing their potential for productivity growth;

3) by inducing the formation of new firms, further contributing to innovation and expanding the size and significance of the cluster itself.

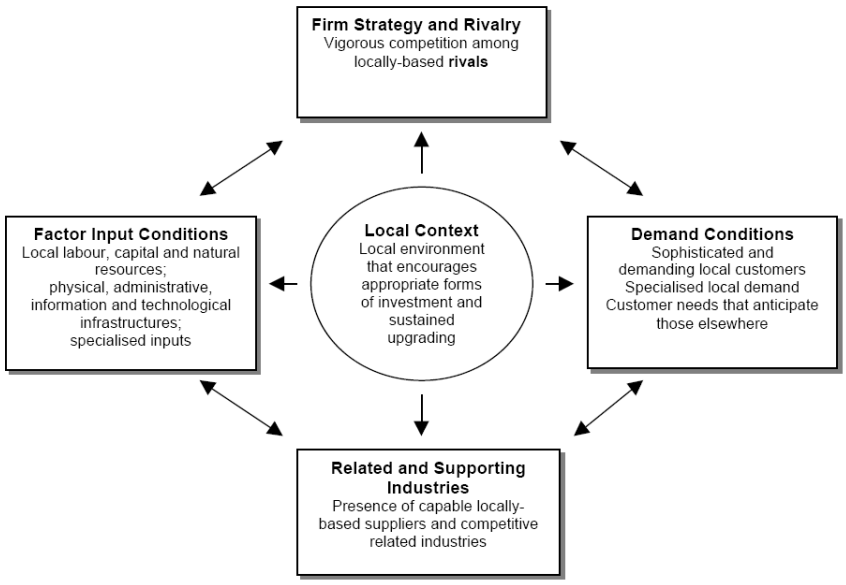


Fig. 2-5 Porter's Competiveness Diamond Model

Porter views social capital as an essential part of the glue that holds clusters together. The competitive advantages that flow from the presence of clusters are closely linked to the value of the information and knowledge that firms are willing to share. The networks and relationships, and the degree of trust constitute the social underpinning of the cluster. He suggests that the mutually beneficial activities of the firms in a cluster generate a number of common assets that can be viewed as

quasi-public goods. The general level of knowledge and information built up in the cluster can act as such a good, if the level of trust is sufficient to generate an easy and mutual exchange of both tacit and codified knowledge. Similarly, the mobility of personnel between firms in a cluster can constitute a similar source of knowledge flows. Even more important, the strength of the cluster can provide an important stimulus to public investment in specialized infrastructure, such as communication networks, joint training and research institutions, specialized testing facilities and the expansion of public laboratories or post-secondary educational institutions. As the depth and value of such investments increase, so do the economic benefits flowing to firms located in the cluster. Thus the strength of the cluster and its supporting infrastructure of quasi-public goods and public institutions create a mutually reinforcing positive feedback loop.

2.4 FDI and Technology/knowledge Spillovers

2.4.1 FDI, MNE and knowledge transfer

There is a significant body of theory on FDI and knowledge spillovers. Hymers (1976) pioneering study on MNEs drew attention to neglected aspects of MNEs role as global industrial organizations. By putting forward the idea that FDI represents not simply a transfer of capital, but the transfer of a "package" in which capital, management, and new technology are all combined, he characterized FDI as an international extension of industrial organization theory. Findlay (1978), Kindleberger (1984), Das (1987), et al. further extended the theory and suggest that compared to portfolio investment, which only involves in the cross-border flow of capital, FDI entails a cross-border transfer of a variety of resources, including process and product

technology, managerial skills, marketing and distribution know-how, and human capital. Another strand of models investigates the effects of FDI on growth using a new growth theory framework (e.g. Krugman, 1979, Lucas, 1988, Romer, 1990, Grossman and Helpman, 1991, Helpman, 1993, et al.). Whereas the neoclassical theory treated technological process as an exogenous process and focused on capital accumulation as the main source of growth, the new growth theory has focused on relating to the creation of technological knowledge and its transmission. It views innovation and imitation efforts that respond to economic incentives as major engines of growth. Therefore, it emphasizes the role of R&D, human capital accumulation and externalities. Influenced by endogenous growth models, more and more researchers focus on technology spillover effects through cases (e.g. Gershenberg, 1987, Rhee and Bolt, 1990, et al.) and econometric (e.g. Blomstrom, 1986, 1989, Kokko, 1994, et al.) studies.

2.4.2 FDI's technology spillovers effects

Several important channels through inward FDI can benefit innovation capability of local firms in the host country are identified (e.g. Masfield and Romeo, 1980, Lim and Fong, 1982, Blomstrom and Kokko et al., 1994, Smarzynska, 2002): First, local firms can learn about the products and technologies brought in by foreign investors, for example, by means of reverse engineering. Second, spillovers can take place through labor turnovers whereby local firms obtain the technological know-how of foreign-investment-related firms by "stealing" their skilled workers. Third, inward FDI has a demonstration effect on local R&D activity. By their mere presence in the domestic markets, foreign products/technologies can inspire and stimulate local innovators to develop new products and process. This helps to shorten the

trial-and-error process of local firms in their search for inventions. Moreover, since the products and technologies that MNEs bring in have already been tested in foreign markets, the perceived risk of innovating along similar directions is lowered for local firms. Finally, spillovers may occur vertically from foreign firms to their local suppliers by means of technological know-how transfer, staff training, and so on. These vertical spillovers can then enhance the innovation capacity of local suppliers.

Chapter 3 Research Question & Analysis Framework

3.1 Research Question

In the “Knowledge Society” era, a common sense is that companies who can learn faster will achieve business success. As was mentioned in Chapter 1, the outer environment of Chinese firms had changed greatly due to radical evolution of economic globalization and China’s economic transition. Under such circumstances, many Chinese companies are experiencing extensive industrial paradigm-shifts.

Our attention is paid to the following research questions:

1) What elements are needed for organizational learning in industrial paradigm-shift?

2) What factors are important to change Chinese enterprises to orient innovation?

3) How can these organizations create innovation through learning?

To answer these questions, two cases are observed and analyzed regarding their organizational learning in industrial paradigm-shift. In the course of our analysis and discussion, we employ the theory of knowledge conversion between two dimensions expatiated in Nonaka’s SECI model of knowledge creation.

3.2 Object Selection

In this research, two cases of Chinese public corporations are selected. Here, we expound why we chose these two cases.

Firstly, enterprise reform is in a very important position in Chinese economy transition, while public corporations play an important role in enterprise reform. That is why the two cases belong to public corporations.

Secondly, the two case companies were restructured from state-owned enterprise and joint venture, respectively. Each of the case companies has its unique manner of organizational learning due to different development history.

Thirdly, so far, the case companies are relatively successful in their operations and management. They have been trying to foster their innovation capacities and have somehow succeeded. The success owes much to their organizational learning, as we observed.

Fourthly, the two companies belong to different industry, experience respective developing trajectory and aim at specific innovation orientation. It is convenient for us to compare and generalize the common success factors which may be suggestive for Chinese companies.

In the following table, we provide a compendium of the two cases.

	Industry	**Industry characteristics**	**Organizational learning Manner**
Case 1: PENAVICO Xiamen	Logistics, Service	Market becomes open and competitive, from government protection to market competition	Taking advantage of social network and historical heritages
Case 2: Amoi Electronics	technology-driven, manufacturing field	technology shift from analog to digital	Taking advantage of borderless technology spillovers

Table 3-1 Two Cases Selected in the Research

3.3 Analysis Framework

3.3.1 Analysis Framework of Organizational Learning

The analysis of the two cases will focus on two angles and three aspects as shown in Fig.3-1.

Two observing angles include inside enterprise and outside enterprise.

Three aspects are environment, knowledge, including individual, organizational and outer knowledge, and learning, including individual learning, intra-organizational learning and inter-organizational learning. The bidirectional arrows mean the connections of each part.

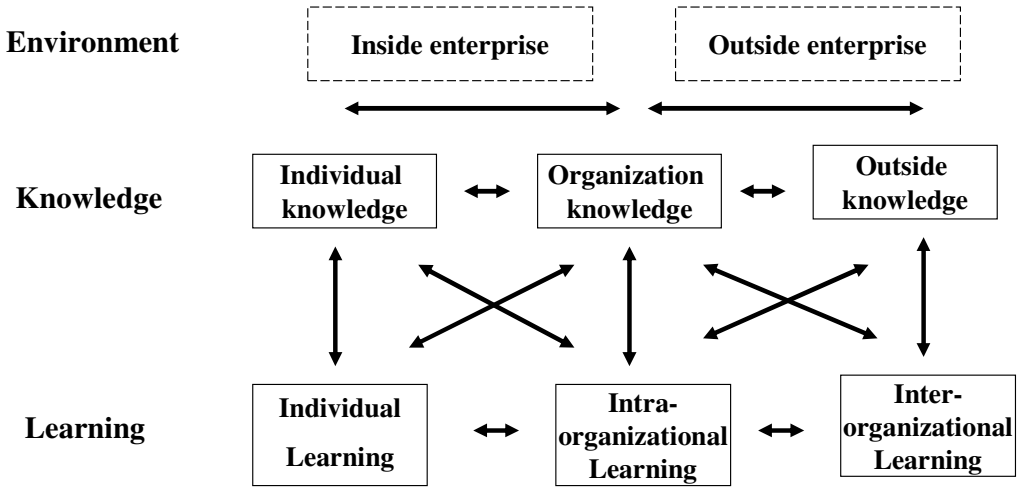


Fig. 3-1 Analysis Framework of Organizational learning

3.3.2 Analysis contents

Concretely, we employ three types of analysis methodology: external analysis,

internal analysis and time analysis. Table 3-1 is a description of the concrete analysis contents.

1) In external analysis, we mainly focus on the outer environment changes, such as change in market environment, change of technology, the business relationship between case companies and the outside parties concerned, and case companies' inter-organizational learning manner, such as characteristics and process.

2) In internal analysis, we focus on case companies' business characteristics, organization characteristics and knowledge management in intra-organizational learning.

3) In time analysis we focus on how case companies match their learning manner with the development stages of business or technology.

Analysis	Contents
External analysis (Outside enterprise)	• Outer environment changes (e.g. market, technology) • Relationship with other organizations • Inter-organizational learning (e.g. characteristics, process)
Internal Analysis (Inside enterprise)	• Business characteristics • Organization characteristics • Intra-organizational learning characteristics (e.g. knowledge type, knowledge flows, knowledge circulation)
Time Analysis	learning characteristics VS business stages

Table 3-2 Analysis contents of the Thesis

The thesis analyzes the case companies respectively in the case study section, based on the above three analyses. In the discussion section, we discuss and summarize the key elements of Chinese enterprises' organizational learning in

industrial paradigm-shift form three perspectives, inter-organizational learning, intra-organizational learning and timing of organizational learning, by comparing the two case companies.

Chapter 4 Case 1: Learning through Human Network
-- PENAVICO, Xiamen

4.1 Case introduction

4.1.1 History of PENNIVICO Xiamen

PENAVICO Xiamen was founded in 1953 as a state-owned and state-run company. The history of the enterprise can be roughly divided into two parts.

1) A branch of PENAVICO China under the state's protectionist policy

In 1953, People's Navigation Company (PENVICO) was approved to be founded by the Central Government. Since then, PENAVICO China had been the sole public international shipping agent. As one of the main fields of Chinese shipping industry, international shipping agency services had been under the state's protectionist policy. PENAVICO Xiamen was a branch company of People's Navigation Company (PENVICO) and entirely controlled by PENAVICO China. PENAVICO Xiamen was the only shipping agent in Xiamen Port until mid-1990s when China partially opened the business to other domestic shipping company or shipping agents. In the end of 1980s, ocean shipping agency was the only business of the company, and less than 30 employees worked in the company.

2) "Second Start-up" to be a public corporation

Since 1990s, especially China's entrance into WTO, with the evolvement of Chinese economy reforms and acceleration of globalization, Chinese shipping agency market has been opened up gradually. Many protectionist policies do not exist any more. Shipping agency services is becoming increasingly competitive. In mid-1990s, PENAVICO Xiamen began its SOE reform, which was called "Second Start-up" by

themselves. In 1996, co-invested by Xiamen Port Development Co., Ltd and China Ocean Shipping Agency, PENIVICO Xiamen was reconstructed as a state-owned joint stock limited company – China Ocean Shipping Agency Xiamen Co., Ltd. (Because PENAVICO is still used as the brand logo, Thereinafter PENAVICO Xiamen is used for short in the article.) Among the stock holders, Xiamen Port Development Co., Ltd is a publicly listed corporation holding 60% of the stocks, and China Ocean Shipping Agency is an entire state-owned company, holding 40% of the stocks. Since then, PENAVICO Xiamen has been trying to establish a modern enterprise system for their business operation. On the other hand, the company has extended their business scope from sole shipping agency services to integrated logistics services in order to add the profit sources. They are also planning to extend their business to Third Party Logistics services in the future.

4.1.2 Current status

After years' development, PENAVICO Xiamen has become the largest international shipping agency, a well-known international forwarding and an excellent provider of integrated logistics in the south-east coastal area of China. A definite corporate concept "Professional Agent, Personalized Service" is becoming a common sense in PENAVICO Xiamen's company management and business operation. Currently, PENAVICO Xiamen possesses an asset of RMB 580 million and five subsidiaries, including an international freight & forwarding company, an air freight company, a customs broker company, a navigation company and a warehousing company. PENAVICO XIAMEN is also the equity participant of three companies, including a logistics company, a freight & forwarding company and a container company. PENAVICO Xiamen has developed close business relationship with

thousands of shipping and trading enterprises from more than 180 countries and regions and has set up a diversified business frame providing integrated shipping and logistics services including international shipping and container agency, sea freight and passenger agency, air freight, international exhibition cargo handling, international transshipment, NOVCC (Non Vessel Operating Common Carrier), coastal feeder service, Customs and CIQ brokering, bonded warehouse, sea & rail transportation, etc. PENAVICO Xiamen is the biggest market-sharer in Xiamen Port, say, more than 60% of agency market share of break-bulks, more than 70% of agency market share of container liners, and 100% of agency market share of foreign passenger ships, dealing with annually 8,500,000 tons of cargo, 350,000 documentations and more than 5,600 voyages of vessels.

4.2 Establishing Close Social Network outside the Enterprise

In compliance with business extension and recruitment of many young employees, PENAVICO Xiamen needs to enlarge their knowledge base, including not only explicit knowledge, such as professional logistics knowledge and market information, but also tacit knowledge, such as management know-how and corporate culture. One of our findings in the case study is that the enterprise has been trying to establish close social networks with parties concerned outside the enterprise.

4.2.1 B2G and B2B E-commerce based on information system

Since mid-1990's, PENAVICO Xiamen has begun to invest funds and human resource in R&D of their own information system with intelligence property right.

As is shown in Fig.4-1, PENAVICO Xiamen's E-commerce system links with

many parties and users, such as Customs, Immigration, Quarantine and Maritime Bureau, shipping carriers, terminal operators, container yards, and cargo forwarders, etc. All data is exchanged very smoothly. All users can achieve following operation via internet including booking, declaration and confirmation, EIR and E-bill issuance, inbound and outbound cargo manifest transmission, container gate-in and gate-out message transmission.

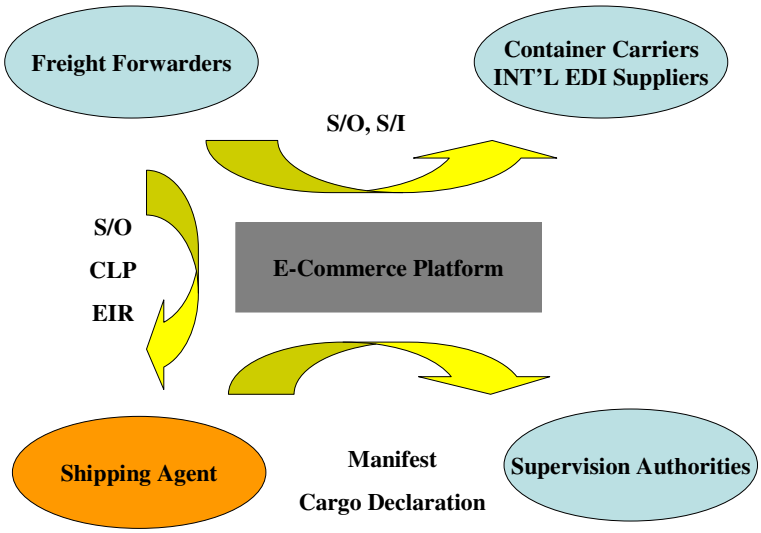


Fig. 4-1 E-commerce System of PENAVICO Xiaman

Another information system is Automatic Inspection System (AIS). PENAVICO Xiamen is the sole user of AIS in the shipping agency industry at Xiamen Port. Their AIS can identify the vessel and trace its movement. On the E-chart, they can capture visual messages such as vessel name, direction, route, and cargo on board. More than that, they are also able to offer vessel's timely information to the port authorities, governmental departments, terminals and the principals, thus uplifts the level of vessel's maneuvering by technical application.

As we can see in Fig. 4-2, PENAVICO Xiaman's information system helps to form a smooth operation chain and to connect the company with the parties concerned to be a tie

network. Through such system, business information, which is mainly explicit, can be transferred and exchanged conveniently.

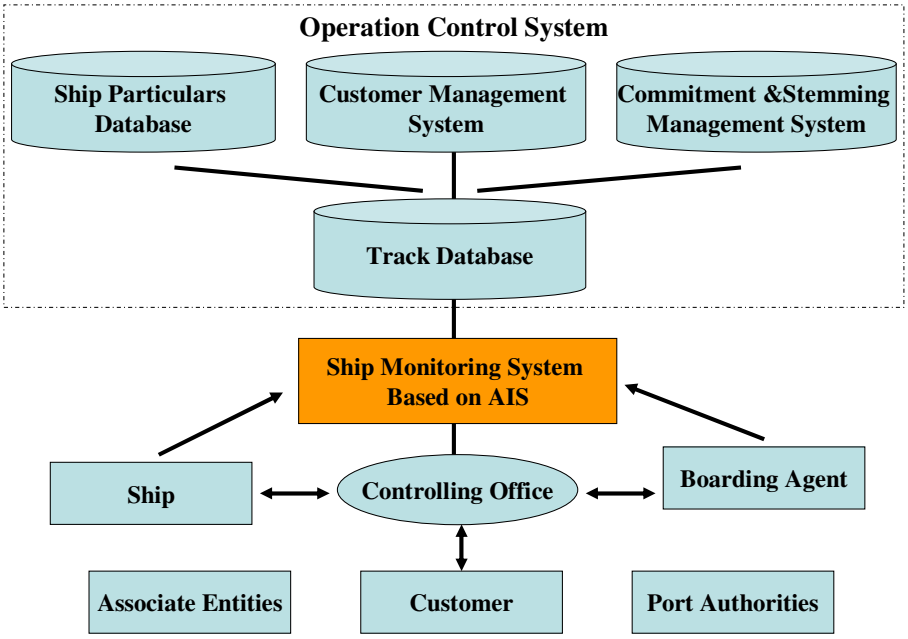


Fig. 4-2 PENAVICO Xiamen's Information System Based on AIS

4.2.2 Increasing intercommunication channels

In the integrated logistics age, PENAVICO Xiamen realizes that personal communications with the outside organizations are critical for them to upgrade their service quality and to create new business scheme. Hence, PENAVICO Xiamen has been trying to establish and maintain close intercommunication channels with outside, as shown in Fig. 4-3.

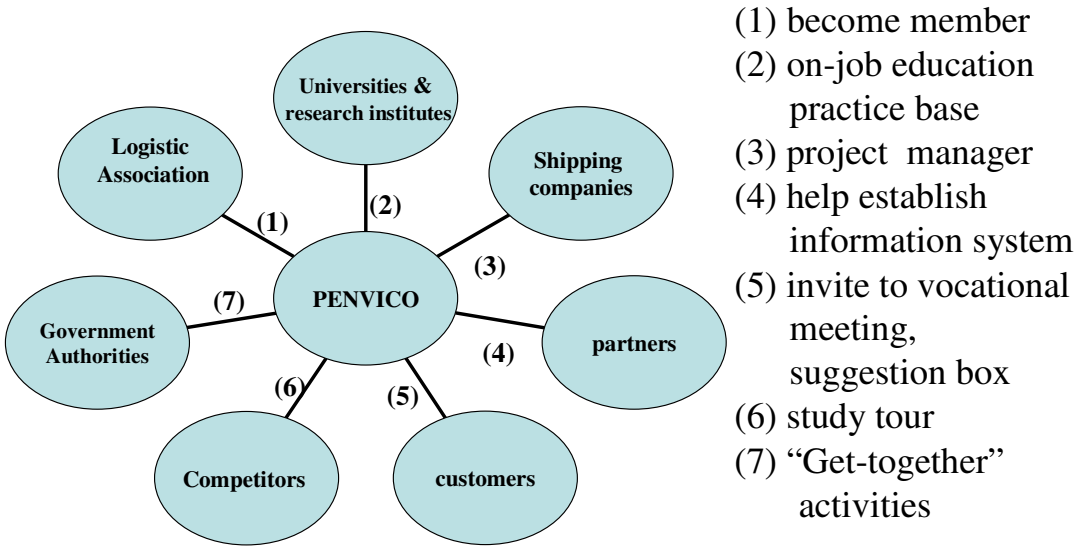


Fig. 4-3 Intercommunication Channels for a Close Social Network

1) Becoming a member of Chinese Logistics Association: As a member enterprise, PENAVICO Xiamen is qualified to participate in legislation of industrial specifications and business symposiums. In this way, the company is able to obtain knowledge on business developing orientation;

2) Establishing on-job education practice base with universities: They invite professors to give lectures on logistics theory to the employees, send talented employees to study for a degree, and provide education practice for university students;

3) Co-researching information technology with research institutes;

4) Setting project manager in important shipping companies;

5) Helping partner companies to join in their E-commerce and information system;

6) Inviting customers to join in their vocational meeting, listening to customers' suggestions;

7) Having “Get-together” activities with government authorities.

Through these activities and in the daily works, PENAVICO Xiamen always encouraged and urged their managers, engineers and ordinary staffs to contact with individuals of the parties concerned.

4.3 Reinforcing Human Networks inside the Enterprise

Another one of our findings is that PENAVICO Ximen has been trying to reinforce human networks inside the enterprise based on some historical heritages, such as Youth League (See Note 3) and Youth Civilized Units.

4.3.1 “Youth League Learning Organization”

In 2001, PENAVICO Xiamen launched a campaign “Youth League Learning Organization”. The purpose of the campaign is to facilitate individual learning, group learning and a sense of collectivism for the young staffs, utilizing Youth League as a platform of many activities. Youth League is a traditional youth movement in the company. The enterprise provides chances for Youth League members to join in collective activities focusing on corporate culture and business development. The collective activities include:

1) Political education and corporate culture education: The Company periodically invites senior staffs, scholars and government officials to have a discussion with the League members about the related laws and regulations and the developing tendency of the industry. The new recruits are organized to learn the company’s history.

2) Project teams: The Company provides financial support and bounty to

encourage League members to form project teams, which are called as “Youth Commando”, voluntarily involving in researches.

3) Youth symposium: The Youth League holds youth symposium once a year. The excellent League members make presentation in the symposiums. The top leaders are also invited.

4) Suggestion contest: Every year, there is a suggestion contest in the company. In such contest, many young staffs have an opportunity to display their talents and excellence.

5) Recreation activities: The Youth League organizes many recreation activities, such as sports teams, Karaoke, outings.

6) Commonweal activities for the community, such as voluntary blood-donating, offering assistance to poor people, voluntary cleaning-up.

Every year, there is a theme of innovation for the “Youth League Learning Organization”. Many activities of Youth League movement will circle around the theme. Here we take the development of the information systems as an example to more concretely illustrate PENAVICO Xiamen’s intra-organizational learning for business innovation by utilizing human network as a platform. Since mid-1990s, PENAVICO Xiamen had realized the significance of information technology in the shipping agency industry. They introduced a set of information systems to deal in E-commerce business based on IBM/iSeries as the core server with double host offsite backup. Since 2002, with the extension of business scope and complexity of operation chart, PENAVICO Xiamen had found that the current information systems had become slow, that it was not enough to handle the huge quantity of data for E-commerce business, and that the information system needed to be upgraded. In 2003, the management of the company decided to improve their information systems. Because there was no ready-made system for their specific uses, they had to research

and develop by themselves. Then this became the theme of Youth League Learning Organization in the year. They called this year as “the Year of Information System”. (The rest may be deduced by analogy. If the theme is Quality Control, it will be “the Year of QC”.) First, all members of the League were called upon to collect the feedback from the individuals they contact in their daily job and give suggestions to the company. Then in the meetings of Youth League groups (commonly once a week for political education), the League members spent time in the discussion about this topic and share the information they obtain. The secretary kept notes. Next, the Youth Symposium and the suggestion contest of that year concentrated on the theme. All levels of the managers, including the top leaders, were present at the symposium and the contest. They also participated in the discussions. In addition, the company and the committee of PENAVICO Xiamen’s Youth League co-sponsored and organized a “Youth Commando” as a project team, which was composed of technology experts and young engineers and technicians majoring in information technology. The company invested R&D funds of 4.86 million RMB into the project. They also applied funds from the Municipal Science and Technology Bureau and started to research and develop their own information systems. The project was quit successful after three years’ efforts. Many innovation items had been made, including X-service Platform for international container transportation, AIS for shipping agency and so on. (The current status of PEANICO Xiamen’s information system has described in the above section.) “Many of our inspirations originate from the suggestions presented by common staffs,” one of the Youth commando members said.

4.3.2 Youth Civilized Units

Youth Civilized Unit is one part of Youth League. Every working section in the

company has the right to apply to be a Youth Civilized Unit, but only the best one can be awarded the title of honor. The evaluation is based on four criteria, including working achievement, group learning, team work and societal contributions. It is a great honor for the unit members, because their achievements will be praised on the billboard. In addition, the group members will have the chance of encouragement, such as bounty and promotion.

The picture (Fig.4-4) shown below is an activity record of a Youth Civilized Unit. As is shown in the picture, the purpose of Youth Civilized units is to make every member in the group identify a sense that "We are a family!" In this family, the members try to provide "First-class service", to learn to be "First-class talents", to form a spirit of team work, and to contribute to the society with a spirit of civilization.

Fig. 4-4 PENAVICO's Youth Civilized Units

4.4 Analysis of Case 1

4.4.1 External analysis

1. Outer business environment of PENAVICO Xiamen

Since 1990s, especially China's entrance into WTO, the environment of shipping industry has changed greatly, which is a great challenge to PENAVICO Xiamen. The changes mainly include: 1) Government's protections have been vanishing. International shipping agency services is one of the main fields of shipping industry, which had been under the protectionist policy over a long period of time, while the days does not exist any more subsequent upon China's entrance into WTO. 2) The market of shipping industry has become open and competitive. With the announcement of "the Regulation of the People's Republic of China on International Maritime Transportation" and "the Implementing Rules for the Regulations of the People's Republic of China on International Maritime Transportation", many domestic and foreign shipping companies and other logistics companies had been authorized to deal with the business of shipping agency services. 3) With the development of logistics theories and the rise of new trends of logistic concept, such as 3rd party logistics, supply chain management, shipping industry had changed from traditional logistics, such as shipping agency, to an integrated logistics era.

Generally speaking, Chinese shipping industry is experiencing an industrial paradigm-shift. It is a challenge for PENAVICO Xiamen in this paradigm-shift due to some disadvantages as analyzed above, while it is also a great opportunity for the company to restructure its business scheme and organization structure.

2. Opportunities for PENAVICO Xiamen in the industrial paradigm-shift:

1) As far as management and operation autonomy is concerned, the Government allows SOEs to restructure their institution and business arrangement instead of the protectionist policies. As a former SOE, PENAVICO Ximen obtained the autonomy to restructure to be a public corporation with a strong financial support from two share-holders. The company became a “real” enterprise who could execute its management and operation activities independently.

2) As far as market opportunity is concerned, the company was allowed to enter into other businesses besides shipping agency services, which was favorable for the restructure and optimization of its business scheme.

3) As far as knowledge is concerned, it was an opportunity for the company to enlarge its knowledge base with the extension of business operations. Firstly, the significance of knowledge accumulation and new knowledge creation was becoming larger because of institution restructure and business extension. The pressure of knowledge innovation urged the company to absorb knowledge from outside and create new knowledge inside. Secondly, they had the opportunity to penetrate the new market information, management know-how and industry direction, because there appeared much more knowledge resources, such as competitors, new customers and business partners.

3. The relationship between PENAVICO Xiamen and the parties concerned

The company was a state-owned company in its history, who partially implemented some authority functions in the field of shipping industry. The production, validation and approval of some legal documents, such as documents of declaration of cargo, customs clearance, bill of landing, were executed by the company. So, the company had a traditional good relationship with many government authorities such as the Customs, Immigration Bureau, Commodity Inspection and

Quarantine Bureau, and Maritime Bureau. Meanwhile, the company is the leading company in the Southeast of China. PENAVICO has long been acknowledged as the traditional call-sign for vessels of foreign and domestic shipping companies. She has developed close business relationships with thousands of shipping companies, trading enterprises and business partners, such as terminal operators, container yards and cargo forwarders.

4. Inter-organizational learning of PENAVICO Xiamen

According to the reality, PENAVICO Ximan had to rearrange their business scheme. The primary issues they had to take into account were how to enter the new market, how to construct the operation chain, and how to foster and organize human resource to match the business scheme. Thus, they need to learn, absorb and accumulate new knowledge from outside the enterprise based on inter-organizational learning. We found that the manner the company adopted was utilizing the social capital they possessed to establish a close social network favorable for their inter-organizational learning. To be concrete, we analyze as follows.

1) The company tried to develop their own information systems. PENAVICO Xiamen invested millions of funds in the research, development and maintenance of information systems ever year. Through the information system, they carried out B2B and B2G business on the basis of E-commerce. The E-platform helps to establish a close business relationship with the parties concerned, to lower various costs and to optimize the operation chain. As far as knowledge is concerned, the information systems contributed greatly to information exchange between all parties, and PENAVICO Xiamen could conveniently obtain much explicit knowledge, such as market information, customer needs.

2) The company tried to establish a close human network, which was favorable

for them to personally contact with the parties concerned. Based on such human network as a platform, the company proactively searched for knowledge for their business innovation from outside. In the case, we found that the company always encouraged and urged their individual members to take an active part in various activities and to contact personally with the parties concerned. On the other hand, they often invited individuals of the parties concerned to comprehend and to give suggestions to their business. They were eager to listen to and analyze the feedback and advices about their innovation of business scheme and operation chain.

As is shown in Fig.4-5, both explicit knowledge and tacit knowledge were absorbed into the case company through human network as a platform for personal intercommunications. A common vision of business innovation was the core of the learning and knowledge absorption.

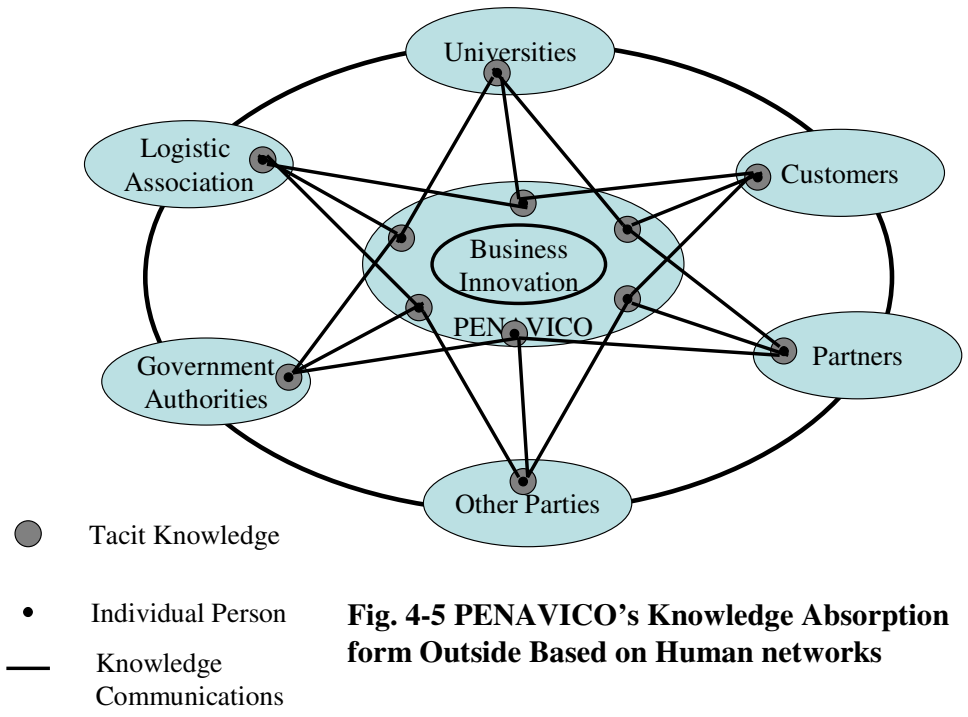


Fig. 4-5 PENAVICO's Knowledge Absorption form Outside Based on Human networks

4.4.2 Internal analysis

1. Business Characteristics

Chinese shipping industry is experiencing a paradigm-shift. The changes of PENAVICO Xiamen's outer environment as analyzed above engendered a far-reaching impact of PENAVICO Xiamen's profit and market share. For Example, as shown in Fig. 4-6, a decrease of PENAVICO Xiamen's agency market share of container liner was obvious. Therefore, the company had to search for new profit sources. In compliance with the reality, the company decided to adjust their business scheme and carry out a new business strategy of integrated logistics, which meant that they would enter into new business fields, extend their business scope and rearrange the operation chain. Table 4-1 is a brief description of PENAVICO Xiamen's blueprint of business strategy.

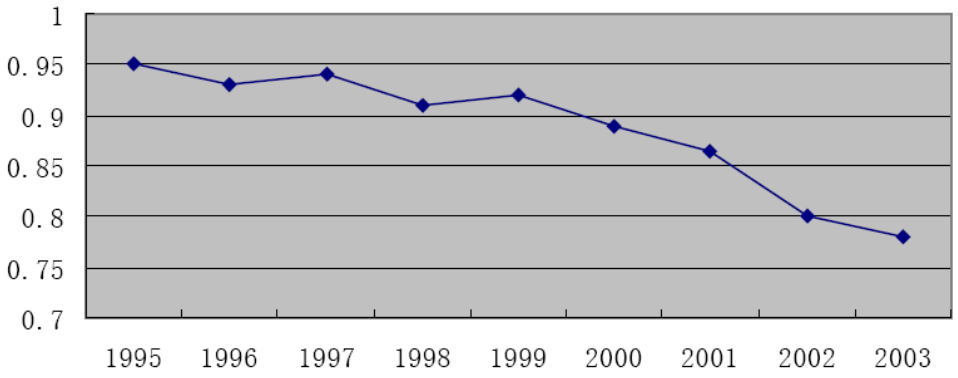


Fig. 4-6 Agency Market Shareof Container Liner of PENAVICO Xiamen (1995-2003)

Source: Market Report of PENAVICO Xiamen (2003), Apr.1st, 2004

	Strategy	Business Scope
Before Paradigm-shift	Monopolization under Government protection	Shipping agency services
After Paradigm-shift	Integrated logistics	Shipping agency as main business, establish subsidiaries, dealing in international shipping and container agency, sea freight and passenger agency, air freight, international exhibition cargo handling, international transshipment, NOVCC, coastal feeder service, Customs and CIQ brokering, bonded warehouse, sea & rail transportation, etc.
Future	Differential strategy, 3PL	Distinctive services

Table 4-1 PENAVICO Xiamen's Blueprint of Business Strategy

2. Organization characteristics

With the adjustment of business strategy, many changes had occurred in the organization characteristics of PENAVICO Xiamen.

1) The company size became larger. In order to enter into new business fields, five subsidiaries were established. The operation chart became more complex. Meanwhile, the number of employees also increased greatly. In 1980's, there were only less than 30 staffs, while currently, there are more than 700 staffs. Most of the staffs are young and highly educated, over 80% of which are college and university graduates, over 70% of which are under 35 years old, over 60% of which received the college education courses in trade, navigation, foreign languages and management.

2) The company adopted a multi-divisional organization structure. More than 50% of the division managers obtained the diploma of post-graduate. They are professional and fairly well-known with rich theoretical and practical experience in the fields of shipping and logistics. They have the capability and are authorized by the

company to take charge of a division alone.

3) The top leaders are also young and highly educated. The general manager, Mr. Song, himself is around 42 years old. He graduated from a famous transportation university and obtained a diploma of Master's degree. When he was in the university, he was a leader of Youth League. He had several years' experience of working in Xiamen Port Harbor Bureau as an administrative official.

4) PENAVICO Xiamen is a former state-owned enterprise, so she has many historical heritages, such as the movement of Youth League.

3. Intra-organizational learning of PENAVICO Xiamen

Through inter-organizational learning based on a close social network outside, much knowledge were absorbed by the individuals of the company. To transfer and disseminate the knowledge in the company and to accumulate in the company's knowledge base, we found that PENVICO Xiamen utilized some of her historical heritage, such as Youth League and Youth Civilized Units, to form a close human network inside company. Next, we analyze PENAVICO Xiamen's intra-organizational learning form the perspective of knowledge creation as follows.

1) We found some of the main reasons of the intra-organizational learning manner. A. The Company had a very long history and had many historical heritages, such as Youth League, Youth Civilized Units, which could be utilized in their learning. B. The general manager was familiar with the affairs of Youth League movement because of his experience. C. Most of the employees are young people, which was suitable for the company to launch the campaign of "Youth League learning organization". Therefore, the company was able to utilize this historical culture to carry out many activities and to foster a sense of collectivism.

2) The company was pursuing a goal of business innovation, which required tacit

knowledge to be transferred and disseminated. Such a close human network established by the company forms a platform or “Ba”, as was mentioned by Nonaka, for close meetings and face-to-face communications. On this platform, individuals could share experience, make sense, empathize and practice with each other. Thus, innovated tacit knowledge on business or technology could be exchanged, transferred and converted. We can find in the information system example that the movement of Youth League Learning Organization helped to form an originating Ba through the ordinary staffs’ personal contacts with the individuals of the parties concerned in their daily works, to form a dialoguing Ba through Youth Symposium and suggestion contests, etc., to form a systemizing Ba through the Youth Commando’s R&D activities and to form an exercising Ba through the staffs’ utilizing the system and their feedbacks. In this sense, such close human network could also become a knowledge network favorable for innovation-oriented learning.

3) A sense of collectivism and solidarity derived from common historical culture formed a strong shared vision for the company’s innovation of business scheme. As is shown in Fig.4-7, on the one hand, based on the shared vision, knowledge flowed smoothly on the platform, where individuals exchanged their knowledge with each other; on the other hand, many activities, such as vocational meeting, youth symposium, suggestion contest, created chances for individuals to transfer their innovated knowledge to the groups, and then to the organization.

4) Based on various activities of Youth League, such as Youth Symposium, suggestion contests, the information and knowledge obtain by individual persons found channels to reach to the group level and the highest management. In this sense, the knowledge flows not only move from organization to groups and individuals (exploitation), but also from individuals and groups to the organization (exploration). (See Fig. 4-8)

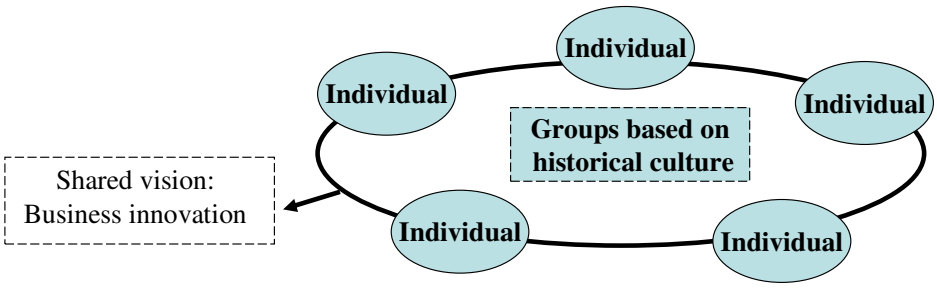


Fig.4-7 Knowledge Communications in Groups Based on Shared Vision

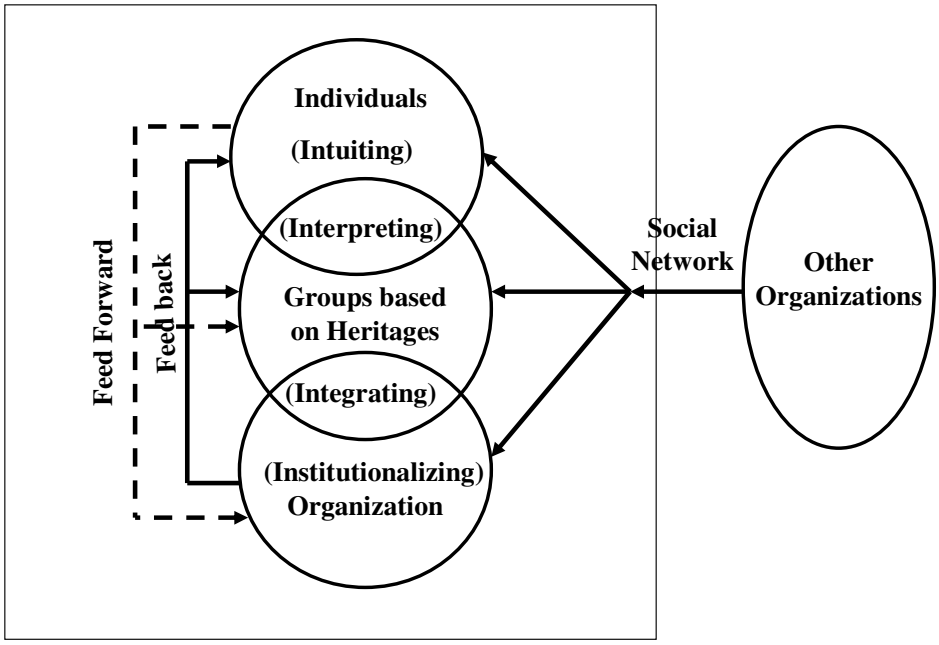


Fig.4-8 Knowledge Flows in PENAVICO, Xiamen

4.4.3 Time analysis

As is analyzed above, a profound paradigm-shift of Chinese shipping industry occurred between mid-1990s and 2001 when China entered into WTO. We found that during this period of time, radical changes also happened in the case company concerning the business scheme, corporate institution, attitude of organizational learning, etc. Here, we generalize the changes of PENAVICO Xiamen by a comparison between before and after the industrial paradigm-shift. (See Table 4-2)

		Before Paradigm-shift	**After Paradigm-shift**
Institution		State-owned Line authority	Public corporation Multi-divisional structure
Business scheme		Traditional shipping agency services	Modern logistics Business innovation
Organizational learning	**Inter-**	Passive, unilateral absorption of explicit knowledge	Proactive searching for knowledge based on social network, personal intercommunication channels,
	Intra-	Formal Top-down education	1) Form platform based on human networks, close meetings, face-to-face communications between individuals and groups 2)A combination of Exploitation & Exploration learning

Table 4-2 A Comparison Between Before and After Industrial Paradigm-shift

Chapter 5 Case 2: Learning through Borderless Technology Spillovers – Amoi Electronics

5.1 Case Introduction

5.1.1 History of Amoi Electronics

Amoi Electronics Company Limited (Thereafter Amoi) was founded in 1981 as the first Sino-foreign joint-venture company. The history of the enterprise was roughly classified to the following three parts:

1) Catching-up through OEM manufacturing in 1980s:

In the 1980s and early 1990s, Amoi mainly engaged in OEM (Original Equipment Manufacturer) production of VTR (video tape recorder) for some Japanese MNEs, such as Sony and Panasonic. Assembly lines, production technology and management technology of Japanese companies were introduced and utilized in the process of production and management.

2) Self-branding by digital era in 1990s:

In mid-1990s, electronics industry entered into the age of digital technology, which enabled many late-comer enterprises to penetrate market by their own brand items. As a matter of fact, in 1997, Amoi created the first own brand name ▪ Amoisonic and was restructured as a public company and listed in Shanghai stock market. Amoi began to research and develop, produce and sell digital household electronics products, such as VCD, DVD players.

3) Advancing own technology by R&D in 2000s:

In 2000, Amoi began to research and develop GSM mobile phone. In March, 2001, Amoi became an authorized GSM mobile phone manufacturer. Since then, Amoi has transformed its main business to R&D, production and sales of mobile

communication terminal products. In this period Amoi concentrated on study and application of core technologies from foreign advanced companies. They established close relations with many foreign advanced companies in the field of R&D, standardization, purchasing, manufacturing and sales of digital products. They even established a collaborative lab with some foreign companies in Silicon Valley, researching and developing digital home theater and hard disc recorder.

5.1.2 Current status:

In 2003, Amoi started a 3C (communication, Computer and consumer Electronics) Interrelated Diversification Strategy. Since 2004, Amoi has become a mature 3C manufacturer in China and formed a 6 product division system of mobile phone, video, audio, communication, photoelectron and IT. They launched a brand name re-engineering project and announced a new brand name logo -- Amoi. In order to make full use of core technologies, Amoi established strategic partnership with many worlds famous MNEs, such as Microsoft, Intel, Qualcom, conducting co-research in 3C technologies. Currently, Amoi has an employment force of over 20,000, including a product R&D team of 1,200 engineers. The average age of employees is about 29. By 2006, Amoi has had a total asset of 4.5 billion RMB and has reached the annual production capacity of 10 million mobile phones and 2 million units of other products.

5.2 Learning from Advanced MNEs

Our findings in the study of Amois proactive learning in the collaborations with MNEs were the following two points:

1) There are two stages in the learning process. One is learning through imitation, while the other is learning through co-research.

2) The two learning stages present different characteristics.

5.2.1 Learning through imitation

In 1980s, Amoi entered into OEM agreements with some Japanese companies, such as Sony and Panasonic, producing VTR. Amoi induced VTR assembly lines and production technology from Japanese companies. Japanese companies sent their engineers to help Amoi to construct standard workshop, to set up the equipments and to train Amoi's engineers. The agreements also included the training of Amoi's engineers at Japanese sites. Meanwhile, packaged technologies were transferred to Amoi with a set of explicit knowledge, such as blueprints, technical specifications and production manuals.

In order to acquire these technologies, a taskforce was formed in Amoi. The members comprised engineers and technicians from various sectors. The participants of those activities included the current president, Mr. Li, 42 years old, graduated from a famous university in Shanghai, majoring in Electronics Engineering. He was awarded a degree of MBA. Since 1985, after graduation from university, he has been working in Amoi. He was promoted from grass roots. He has ever taken in charge of Quality Inspection Department, Planning Department, Office of Export Affairs and R&D Center. He himself had the experience of being trained in foreign companies and working with foreign engineers. Also, the current vice president, Mr. Huang, was an interpreter of Japanese engineers. The taskforce members worked all day long with the Japanese engineers. In the evening, they studied literature materials, such as blueprints and instructions for assembly, disassembled and reassembled sample

products and discussed with each other. They collected questions and consulted Japanese engineers the next day. In this way, the members of the taskforce mastered the technology essentials and obtained valuable technology information. The most competent engineers trained by Japanese companies were assigned to production and production engineering departments. They soon became the backbone of production technique, trainers of workers and consultant of problem-solving.

Based on the assembly lines, production technology and product blueprints introduced from Japanese company, the company began to produce VTR. But more important is that the company gradually understood many things about technical and managerial know-how through such kind of technology imitation, such as how to organize production, how to open up marketing channels, what kind of product was popular in the market, what kind of employees should be recruited, how to train them, etc. This kind of knowledge was not transferred directly from Japanese companies. It was through observation, trial-and-error practice and discussion by individual persons that the company learned the know-how.

Those kinds of much amount of explicit and tacit knowledge accumulated inside the enterprise contributed so much to the huge advance of the enterprise in digital era. The technology shift from analog to digital brought them tremendous opportunity to penetrate the market, because it made much easier to produce the items by assembling many module units purchased from outsourcing companies. However, if they have not accumulated the knowledge, it would not be so easier to get into the market.

5.2.2 Learning through co-research

By mid-1990s, Amois technical and managerial knowledge base has upgraded to a higher level through the above learning. They have fostered many talented engineers,

who can develop various products besides VTR applying CAD system. Amoi began to conducted co-research with MNEs. With the company enlarging, the number of engineers increasing, R&D capability upgrading, the range and intensity of co-research is growing deeper and deeper.

Comparing with imitative learning, co-research learning presents some characteristics:

1) Guided by R&D strategy: The Company realized that core technologies of electronics products were only mastered by some top companies and that Amoi hadn't had the capacity to develop core technologies at current stage. But they believed that the company could make good use of core technologies developed by those foreign top companies and develop new products through deeply comprehending the demands of the market and consumers. So, Amoi adopt a strategy called "Secondly Core Technology Strategy". The strategy includes two stages: At current stage, Amoi concentrates on innovation and breakthrough of product application functions, such as appearance design, application functions and system integration. In the future, Amoi will gradually approach radical innovation of core technology. The guideline of R&D at current stage is "Practical application and Exquisite refinement". Technology tracking is the main task.

2) Warranted by various institutional, managerial and operational measures: a) Amoi changed its organization to be more flat and deconcentrated. Six subsidiaries and divisions correspond to Communication, Computer and Consumer Electrics respectively so as to develop corresponding products more professionally. A complete ERP system enables the six subsidiaries and divisions to implement professional operations of development, procurement, production and sales on the identic network platform. b) Amoi made great efforts to expand its marketing and customer service networks domestically and abroad. Through the networks, feedbacks of customer

needs and information of rivals are quickly transmitted to decision-makers and R&D groups. C) Amoi launched its "China Best" brand name re-engineering project to reinforce brand reputation. d) Amoi has passed the authentication of world famous institute BSI for ISO9001 and TL9000 certification. e) Amoi recruits young employees (around 20s on average) and promotes young managers (around 30s on average) in the company.

3) Various co-research modes: At the outset, Amoi adopts short-term co-research modes, such as co-investment in collaborative lab abroad, sending competent engineers to join in a certain project, temporarily retaining foreign engineers from MNEs to work in Amoi's R&D sector. Later, under strategic partnership agreement, Amoi undertook long-term co-research with famous MNEs on an integration basis. In this way, they could track the direction of technology development.

4) Obtaining knowledge through multi-channels: a) Amoi set up research centers in Xiamen, Shanghai and Nanjing respectively, because in the latter two cities there are thousands of affiliates and many R&D centers of MNEs. It is convenient for them to approach the knowledge resources and human resources. b) Amoi has set up many sales subsidiaries abroad. Frequently, they shared procurement and marketing channels with MNEs. c).A Japanese expert was assigned to be vice general manager of a division, taking charge of R&D and production of PHS products. He was once an engineer of a famous Japanese MNEs, having rich experience in R&D advanced digital technology. d) Every year Amoi sends excellent employees to foreign companies for a study tour.

Various kinds of knowledge, especially tacit knowledge of technology, marketing, management, concept, etc., were absorbed in the process of such co-research learning and contributed greatly to Amoi's core competence. They are enabled to track the updated directions of products and to establish a capacity of

applicative innovation based on core technologies of MNEs. More importantly, they are accumulating tacit knowledge for the future development at a higher innovation level.

5.3 Flexible Team Learning inside the Company

Amoi attaches great importance to team learning. A case in point is QC (Quality Control) team.

In order to popularize TQM (Total Quality Management), Amoi organizes QC teams to learn basic knowledge of TQM and methods of job improvement. Currently, there are more than 800 QC teams in the company. Each team consists of 5-9members, including a team leader, a secretary, investigators and statisticians. The team members are combined together freely and voluntarily. The team leader is selected democratically. Commonly the team members come from the same department and have good relationship. The TQM Popularization Office provides periodical training to the team leaders. Usually, QC teams conduct an activity once a month. Each time, before the activity, they pose a problem of jobs or routines. Then they hold a meeting, discussing on the problem-solving in a free atmosphere. The achievements will be presented in seminar held by workshop section, department or company level, according to the quality of the achievement. Excellent achievements will be encouraged with bounty. In this way, Amoi greatly upgrades customer satisfaction towards products and services.

5.4 Analysis of Case 2

5.4.1 External analysis

1. Presence of multinational enterprises (MNE) and knowledge spillovers

With the expansion of economic/industrial globalization, more and more multinational enterprises (MNEs) undertake foreign direct investment (FDI), research and development (R&D) and resource allocation all around the world. China， under its "market for technology" policy[1], has been the largest recipient of FDI among the developing countries and one of the important R&D bases of MNEs since 1990s (UNCTAD's *World Investment Report,* 2005). MNEs' transnational operations and R&D activities, and international industry transfer inevitably engender technology spillovers. This is one of the most important opportunities for Chinese local firms to induce, assimilate and absorb existing advanced technologies from advanced countries.

2. Technology of electronics industry shift from analog era to digital era

In mid-1990s, electronics industry entered into the age of digital technology,. The technology shift brought them tremendous opportunity to penetrate the market by their own brand items, because it made much easier to produce the items by assembling many module units purchased from outsourcing companies. Hence, the technology shift brought a radical industrial paradigm-shift to Chinese electronics enterprises.

3. Characteristics of Amoi's inter-organizational learning

The case company we studied successfully transformed itself from a small-size

firm dealing in OEM manufacturing for MNEs to a listed electronics hi-tech enterprise with relatively strong innovation capacity and core competence. Comparing with many other Chinese local firms, the case company shows many unique manners in their learning through borderless technology spillovers.

Here, we analyze the case from the perspective of knowledge transfer and knowledge creation in the process of their effective learning as follow:

1) Learning manner and learning orientation

MNEs' presence in the host countries forms a platform, or "Ba" as mentioned by Nonaka, for local firms to share experience, make sense, empathize and practice. It is much easier for local firms to learn explicit knowledge from MNEs, because the former can buy the latter's products, blueprints and equipments in the market place and obtain the technology based on studies. However, tacit knowledge is more critical for a firm's innovation capacity (e.g. Cavusgil et al. 2003), but, unfortunately, it is difficult to buy in the market place. Many Chinese local firms focus too much on the explicit knowledge by inducing foreign manufacturing facilities and technologies. After that, they commonly depend much on total cost advantage. This causes severe competition among indigenous firms. The fact is that, in many cases, the technology gap didn't narrow, instead, the gap to some extent enlarged ((Lv, 2006)). Our findings in the study of Amoi's proactive learning in the collaborations with MNEs were the following two points: There are two stages in the learning process. One is learning through imitation, while the other is learning through co-research. The two learning stages present different characteristics. At the early stage, the company in the same way mainly absorbed explicit knowledge from MNEs. But, when the company accumulated much explicit knowledge and tacit knowledge inside, they switched learning orientation to absorbing MNEs' tacit knowledge, such as product concepts, directions of R&D development, etc., in the way of co-research learning. This

contributed greatly to their application innovation. More importantly, based on this capacity, they will have the chance to accumulate and create enough tacit knowledge for larger advance in the future.

2) Tacit knowledge absorption in imitation learning and co-research learning

It is found in the case company's learning process that the company is trying to create favorable conditions for individual persons to personally contact with advance tacit knowledge from MNEs. As is showed in Fig. 5-1, at imitative stage, tacit knowledge transferred from MNEs to local firms through few personal communications and some particular media, such as blueprints, machines, etc. Such kind of tacit knowledge transfer was basically indirect; while at co-researching learning stage, Aomi made much effort to open up many channels for extensive personal intercommunications. Through direct communications, Amoi not only absorbed tacit knowledge from MNEs but also created new ideas and new knowledge. In fact, co-research is not new in the worldwide inter-organizational learning, but it seems that many Chinese local firms have settled into imitative learning.

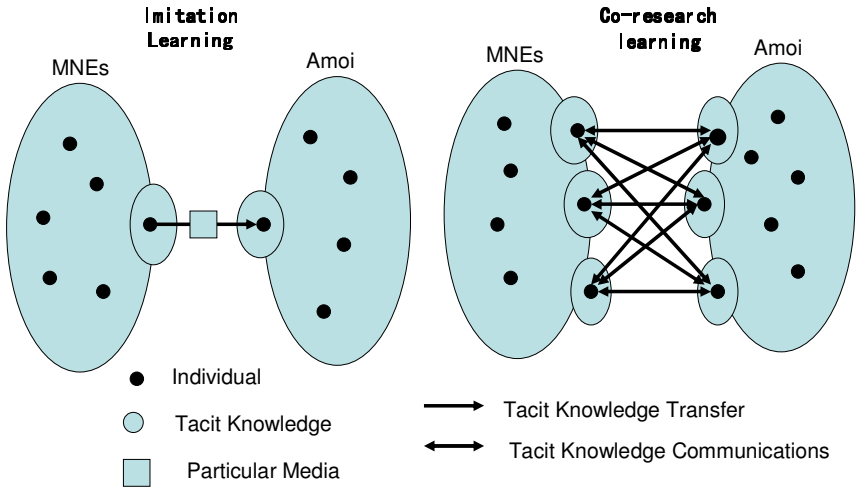


Fig. 5-1 Tacit Knowledge Absorption of Amoi in Imitation Learning and Co-research Learning

5.4.2. Internal analysis

1. Business characteristics

As far as technology is concerned, Amoi is a late-comer in the market. According to our study of the case, we found that the company's business strategy is closely related to the technology trajectory. Here, we generalize Amoi's business strategies and technology development in various periods of time in Table 5-1.

	Technology	**Strategy**
1980s & early 1990s	Assembly capability of VTR Lack of R&D capability	OEM for Japanese companies
Mid-1990s	Productivity of digital products Foster a team of engineers Improved technology capability	R&D, produce and sale of digital household products by self-branding
Since 2000	Applicative R&D capacity of mobile phone based on others' core chips	R&D, produce and sale of mobile communication terminal products
Since 2003	Enhanced application technology of 3C products	3C Interrelated Diversification Strategy

Table 5-1 Amoi's Technology and Business Strategy

We also found that the process of Amoi's technology development is like stepping up the stairs. Technology upgrades to a higher level when explicit knowledge and tacit knowledge is accumulated and created to an extent. The qualitative change takes place based on innovation-oriented learning through borderless technology spillovers and knowledge creation through managerial innovation and unremitting

efforts. Fig. 5-2 is a schematic description of Amoi's technology development.

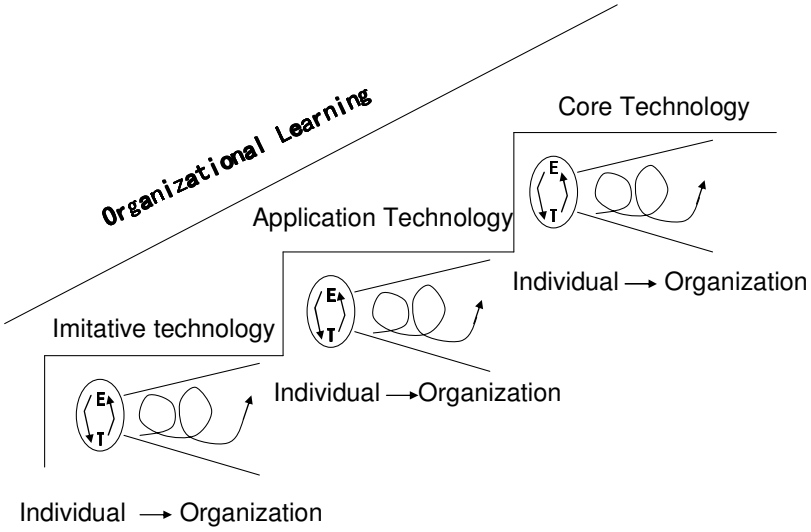


Fig. 5-2 Amoi's Technology Development

2. Organization characteristics

1) Amoi organizes QC teams to learn basic knowledge of TQM and methods of job improvement. Currently, there are more than 800 QC teams in the company. They are closely communicated teams with common vision.

2) The top leaders of Amoi play a significant role in the innovation-oriented learning and knowledge creation. There are some unique characteristics in their knowledge background. First, they are young and highly educated, which means their have the basic knowledge of advanced management. Second, they have been working in the company for very long time and promoted from grass roots, which enabled them to be familiar with the firm's various situations. Third, they have had many

personal experiences in dealing with MNEs since the early stage of the company. The top leaders' knowledge background enables them to have a keen insight into the firm's technology and knowledge base. Based on this, they could formulate suitable technology strategies and a flexible organization to match innovation-oriented learning, and advance technology and knowledge.

3. Intra-organizational learning of Amoi

Top-down education and training is still a typical way of organizational learning in most Chinese companies, while the case company extensively adopt team learning manner, which is considered to be an effective learning manner in the organizational learning researches (e.g. Peter Senge, 1995).

Tacit knowledge is deeply rooted in personal experiences, subjective insights, values and feelings and can only be shared through extensive dialogues and discussions. Amoi's 800 QC teams are organized flexibly based on common vision, teamwork and tight relationships. It is thought to be effective to share and accumulate tacit knowledge, and to create new knowledge through the circulation of the two dimensions of knowledge. In this sense, the case company has a more flexible organization, which contributes to effective organizational learning and knowledge creation, comparing with many other Chinese local firms. Fig. 5-3 shows the tacit knowledge communications through flexible groups in Amoi.

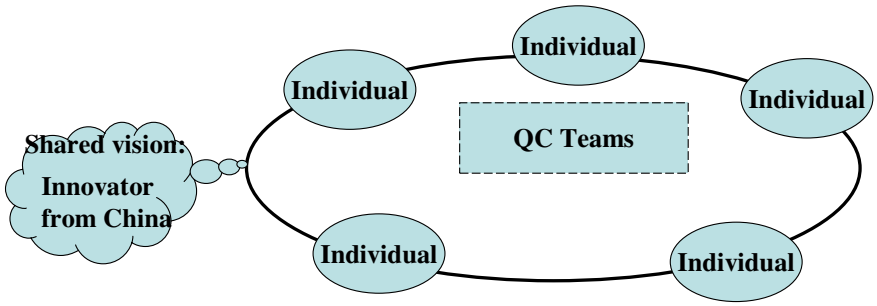


Fig.5-3 Tacit Knowledge Communications in Flexible Groups with Shared Vision in Amoi

5.4.3 Time analysis

Technology breakthrough often needs a turning point. In the case we studied, the technology shift from analog to digital, which brought a radical industrial paradigm-shift for Chinese electronics industry, brought the case company huge opportunity to penetrate the market and conduct application researches based on module units they could purchase from outsourcing companies. Amoi made full use of this opportunity to absorb knowledge, create its own brand and capture market. Amoi could seize the opportunity because she had accumulated much knowledge, both explicit and tacit ones, to upgrade the technology through unremitting efforts.

The paradigm-shift based on technology shift in Chinese electronics industry had a far-reaching influence on Amoi's business strategy, technology development and organizational learning manner, which we summarized in Table 5-2.

		Before Paradigm-shift	After Paradigm-shift
Technology		analog	digital
Business		OEM	Self-branding Advancing technology by R&D
Organizational Learning manner	**Inter-**	Imitative Particular media	First stage: Co-research Second stage: Strategy partnership Various personal communication channels
	Intra-	Top-down education	Learning based on flexible organization with shared vision

Table 5-2 A Comparison Between Before and After Industrial Paradigm-shift

Chapter 6 Discussion

In Chapter 4 and Chapter 5, we introduced two cases of Chinese public corporations mainly regarding their organizational learning in the background of China's economic transitions and the evolution of economic globalization. We also provided external analysis, internal analysis and time analysis on the case companies' inter-organizational learning and intra-organizational learning respectively.

In Chapter 6, we will discuss and summarize the key elements of Chinese enterprises' organizational learning for innovation capacities in industrial paradigm-shift by comparing the above two cases.

Prior to the summary and discussion, the significance of tacit knowledge management and the relationship between tacit knowledge and innovation in organizational learning should be emphasized again, because they are critical for Chinese enterprises to create innovation capacities in the globalization and knowledge society era. In the recent literature, much attention has focused, in particular, on the importance of 'tacit knowledge' for sustaining firms' competitiveness, and its role in technological innovation and organizational learning. Tacit knowledge represents the principal source of sustainable competitive advantage in an increasingly dynamic and turbulent business environment (Grant, 1996; Hall, 1993; Winter, 1987). The emphasis on the importance of developing distinctive core competence, intangible assets or firm-specific 'dynamic capabilities' has emerged as a central theme in the resource-based strategic management literature (Prahadlad and Hamel, 1990; Itami, 1987; Teece and Pisano, 1994). Interest in tacit knowledge has also grown rapidly as studies of technological innovation and diffusion have increasingly identified tacit knowledge as an important component of the knowledge used in innovation (Dosi, 1988; Rosenberg, 1976 and 1982; Pavitt, 1987; Senker, 1995; Howells, 1996). The

growing complexity of technological systems and rapid change in the knowledge and scientific base has made tacit knowledge ever more important in the process of learning and knowledge accumulation (Lundvall and Borras, 1997). Literature in the field of organizational learning emphasizes the importance of tacit knowledge in collective learning and organizational knowledge creation (Nonaka and Takeuchi, 1995; Spender, 1996b).

In the next section, the summary and discussion will prosecuted from the following three perspectives: learning outside enterprise, learning inside enterprise and timing of learning.

6.1 Learning outside Enterprise

As is mentioned in the literature review, knowledge of the firm is socially embedded. It is rooted in organizational coordination mechanisms and routines which, in turn, are heavily influenced by societal institutions. Societal level factors such as education and training systems and social relationships between different occupational groups are important factors shaping organizational structures and processes in which the knowledge of the firm is embedded. In this sense, we found important implications of Chinese enterprises' inter-organizational learning in industrial paradigm-shifts.

1) Chinese enterprises must identify the outer knowledge sources according to their business environment. In other words, they should know where their can obtain the knowledge.

In Case 1, PENAVICO Xiamen is a leading company in the region. They are aiming to rearrange their business scheme and enter into the new market. Therefore, form government authorities, they can obtain the knowledge of policy orientation;

from universities and research institutes, they can obtain the theoretical knowledge of modern logistics and the knowledge of new technology; from the parties concerned in the market, such as partners, customers and even rivals, they can obtain the knowledge of their management model and operations. That is to say, they can obtain knowledge in their social network.

While in Case 2, Amoi is a late-comer in electronics industry. In order to improve and upgrade their technology, they located MNEs' technology spillovers as the main knowledge source, because MNEs are the possessors of advanced "explicit" knowledge (e.g. information on products, patents, equipments and assembly lines). Whilst, "tacit" knoledg, such as managerial know-how, corporate culture, sense of value, entrepreneurship, is the more important element which enables them to possess strong innovation capacity and global competence.

2) Another important question Chinese enterprises must take into account in their inter-organizational learning is how to absorb knowledge from outside. As we observed in the two cases, Chinese enterprises should open up intercommunication channels as many as possible. In Case 1, PENAVICO Xiamen developed their own information system to collect and exchange explicit knowledge, such as market information. They also created favorable conditions for personal connections with the parties concerned through various activities. Tacit knowledge such as suggestions for their business and technology were obtained by individuals of the company. In Case 2, Amoi formed task force to absorb explicit knowledge from blueprints, machines and products, etc. They also established R&D centers and carried out co-researches with MNEs to absorb tacit knowledge based on personal communications.

3) Chinese enterprises can depend differentially on different knowledge types and adopt different approaches to learning. The relative importance of tacit vs. codified knowledge and their role in learning and innovation can vary greatly between

firms in different social contexts. For example, PENAVICO Xiamen adopts a learning manner through close tie with parties concerned, because as a leading company, they have traditional good social relationships. While Amoi adopted imitation learning in the early stage and co-research manner in the later stage. In this sense, the most important thing is not the learning manner itself but the adaptability and effectiveness of the learning manner.

6.2 Learning inside Enterprise

According to Nonaka (1995), knowledge can be transferred from outside, but competitive knowledge can only be created inside the organization. The creation of knowledge is based on the circulation of explicit mode and tacit mode. Knowledge creation as a source of innovation of business/industries strongly depends on tacit knowledge produced in individual persons and the way to share tacit knowledge and transform it to explicit knowledge in organization.

By comparing the two case companies' intra-organizational learning, we found some indications for Chinese enterprises' intra-organizational learning concerning tacit knowledge management and knowledge circulation.

First, at least three elements are indispensible: 1) flexible and harmonious organization; 2) the platform for group learning; 3) a shared vision for the groups. In Case 1, PENAVICO Xiamen utilized the traditional heritages, such as Youth League and Youth Civilized Units to form such groups conducive for their group learning; while in Case 2, Amoi made good use of TQC teams, which they learned from Japanese companies during their long-term cooperation with these companies. This indicates that for Chinese enterprises, each of them has their unique heritages during

the course of development, which they can adopt the useful parts to carry out group learning and profit the knowledge circulations for new knowledge creation. The platform for group learning is indispensible, but the formation of such platform can vary from case to case according to the reality of different company.

Second, Chinese enterprises must change their organization structure to make it not only favorable for knowledge feedback flows but also for feed-forward flows, as shown in Fig. 6-1. Rigid organization structure and top-down education and training are still a typical way of learning in most Chinese enterprises. However, the traditional bureaucratic, hierarchical model of organization is ill suited to tacit knowledge and hence detrimental to learning and innovation. In the cases we studied, they have been trying to change their organization to be decentralized and flexible. It is turned out that the organic model of organization, based on decentralized problem solving, horizontal coordination and cross-functional team working, is the most appropriate organizational form for the creation of tacit knowledge and learning. It is indicated that Chinese enterprises should change internal organization as a key strategy for promoting the learning and innovative capabilities of firms.

6.3 Timing of Learning

Industrial paradigm-shift is always a great challenge for enterprises, because it is inevitably followed by the business environment changes and the break of business traditions. As for the two cases we observed, the paradigm-shift in their industries makes it a good opportunity for them to involve in innovation.

In Case 1, the paradigm-shift engendered an extensive competition in the market, but meanwhile, the company had the opportunity to enter into new markets and rearrange their business scheme.

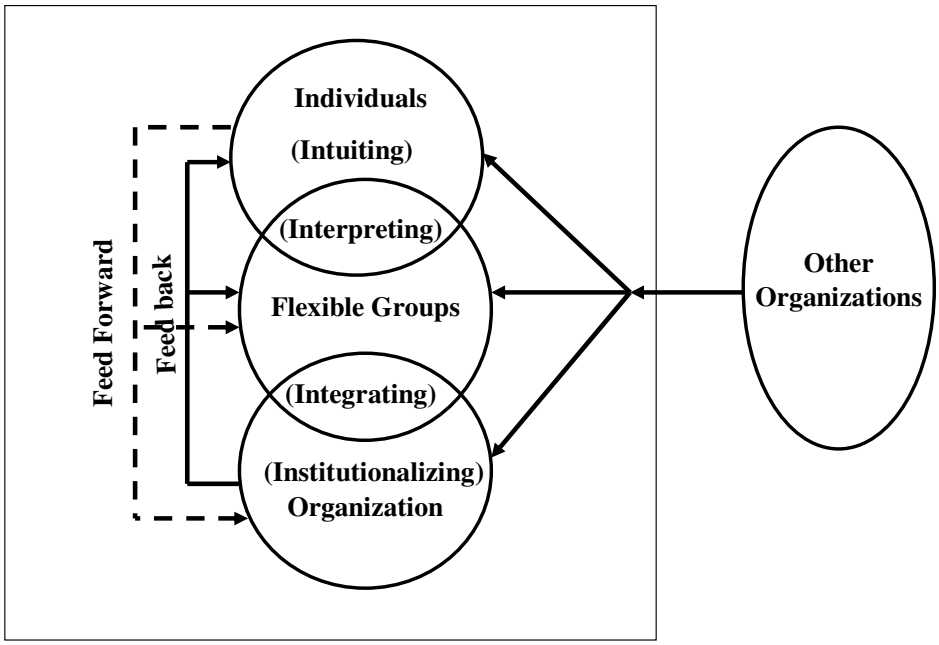


Fig. 6-1 A Model of Knowledge Flows for Chinese Enterprises' Learning

In Case 2, electronic technology shift from analog to digital provided an opportunity to penetrate the market and conduct application researches based on module units they could purchase from outsourcing companies. In reality, such opportunities are often existent in paradigm-shifts. This implies that industrial paradigm-shift can be a good opportunity for Chinese enterprises to challenge innovation.

A question arising here is why many Chinese enterprises couldn't seize the opportunity while some successful companies such as the two case companies could. The success of the two case companies may indicate some of the hints.

First, to adapt industrial paradigm-shift, the case companies have accumulated much knowledge, both explicit and tacit ones, through unremitting efforts through different manner of organizational learning.

Second, the case companies changed their business strategy and organization structure to fit for their learning manner.

Third, the unique knowledge background and experiences of the top leaders enable them to have a keen insight into the firms' business/technology and knowledge base. Based on this, they could formulate suitable business and technology strategies to match innovation-oriented learning and advance business scheme, technology and knowledge level.

Chapter 7 Conclusion and Future study

7.1 Conclusion

China has been experiencing an economic transition since 1978. At the current stage, many Chinese firms still focus too much on total cost advantage strategy after inducing manufacturing facilities. This causes severe competition among indigenous firms on the one hand, and affects development of innovation capacity on the other hand. To survive and develop in the era of globalization and "Knowledge Society", it is critical and indispensable for Chinese enterprises to accumulate and create knowledge for core competence through effective organizational learning.

In this thesis, two successful enterprises of Chinese public corporations in two different industries, consumer product manufacturing and logistics service, are observed. Even though the industry fields of these enterprises are quite different, there were found many similarities between two cases. The case study mainly focuses on the paradigm-shift in the industries they belong to and how they learn knowledge outside and inside enterprise. After careful examination and analysis, it is suggested that:

1) Industrial paradigm-shift can be a good opportunity for Chinese enterprises to foster core competence, only if they change their organizational learning manner and knowledge management.
2) To seize the opportunity of industrial paradigm-shift, firms' organizational learning should be innovation-oriented. That means there should be a theme of innovation in firms' organizational learning, such as innovation of business scheme in Case 1 and technology innovation in Case 2.
3) To execute innovation-oriented learning, enterprises should utilize their

historical heritage and organizational culture by modifying to fit the new reality they are facing, as indicated in the cases. They should also carefully utilize the timing of changing the surrounding circumstance.

4) Tacit knowledge management is critical for innovation-oriented learning. Because tacit knowledge cannot absorb through documentations like explicit knowledge, enterprises should change the human resources and reform their organizations to be suitable for absorbing, sharing, and crating tacit knowledge. In industry paradigm shift, whether enterprises can change their organizations or not is one of the most essential issues.

In spite of some uniqueness of organizational learning manner in the two case enterprises, several important implications are essential for Chinese firms in their innovation-oriented learning and tacit knowledge management, because each enterprise in any industry should take account of tacit knowledge management for forming the core competence. The implications are summarized as follow:

1) Tacit knowledge is the core of fostering enterprise's core competence. In order to absorb tacit knowledge from outside and transfer it inside the organization, it is necessary for Chinese enterprises to open up personnel communication channels with the organizations concerned as many as possible.

2) Innovative knowledge generates only when tacit knowledge inside individuals can effectively be transferred and transformed based on the circulation of explicit mode and tacit mode. Flexible organization forms, such as closely communicated teams with common vision, may be effective to match tacit knowledge transferring and transforming.

3) The growth of knowledge base is a process of absorption, accumulation, and creation of knowledge by circulating explicit knowledge and tacit

knowledge, as Prof. Nonaka pointed out. Whereas, when knowledge base upgrades to a higher level, strategy change and new knowledge sources are necessary to match higher level organizational learning. A firm's top leader must have a keen insight into the stage of the firm's technology, business and knowledge base, and seize the right time to formulate suitable strategies. Top leader's knowledge and experience is very important.

4) Organizational learning and knowledge management are positively related to the stages of enterprises' internal and external conditions. Industrial paradigm-shift urges Chinese enterprises to reconsider their organizational learning and to adjust their learning to an innovation-oriented style. That is, for example, good match of learning style to business status engenders effectiveness in enterprises' organizational learning. In this sense, good timing of learning is very important.

5) To establish a group learning platform, some historical heritages of Chinese enterprises, such as Youth League, Civilized Units, can be useful. To utilize such historical heritages would be one effective clue to realize innovation in Chinese society. But on the other hand, we have to be very careful to watch those historical culture's limitation and shortage to advance. In any moment, the organizations should aim to be change to adopt the new coming reality of the market and the industry world.

These implications obtained through this research can be helpful not only for Chinese enterprises but also for many enterprises in many other countries, particularly when they are facing to a paradigm shift of the industries.

7.2 Future Study

In this research, two cases of Chinese public companies are chosen and study. Their success in the industrial paradigm-shift provided several suggestive implications for Chinese enterprises. However, we know that two successful cases are not sufficient to illuminate the solutions to the problems Chinese enterprises encountered. On the other hands, at current stage, the two companies are successful, but it doesn't mean they will always succeed on the basis of their unique organizational learning manner. Deeper and further examination and analysis of the cases are necessary. To illuminate effective organizational learning in Chinese economic transitions and industrial paradigm-shifts, much more cases from different industries and different forms of enterprise will be studied. We have been collecting large amounts of data and materials on this research issue. As for the next step, some Chinese private companies will be studied. A comparative study of public companies and private companies on the issue of organizational learning will also be conducted

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Appendix

Appendix 1 Notes

Note 1: According to China's Company Law, *"In the case of a joint stock limited company, its total capital shall be divided into equal shares, shareholders shall assume liability towards the company to the extent of their respective shareholdings, and the company shall be liable for its debts to the extent of all its assets* (*Article3, Chapter I of Company Law of the people's Republic of China, 1999).* A joint stock limited company in China's *Company Law* is roughly equal to a public corporation in the U.S. (Liao Fan,)

Note 2: "Market for Technology" policy is a set of measures to encourage and attract FDI by opening up its huge domestic market on a larger scale. The policy was officially launched in 1992. One of the primary motivations for China to implement "market for technology" policy and attract FDI was, and still is, to obtain advanced technology from developed countries and then base on this to establish domestic innovation capacities.

Note 3: Youth League: The China Youth League (中国共产主义青年团) is a youth movement for youth between the ages of fourteen and twenty-eight. Most high school students are Youth League members when graduating. The movement of Youth League remains in many of Chinese enterprises, especially state-owned or former state-owned enterprises

Appendix 2 Laws and law-like administrative directives

The Chinese administrative system has an elaborate hierarchic classification of the documents it produces. Apart from regular laws that usually take very long to pass and law-like administrative directives, there is a hierarchy of administrative documents. this hierarchy – in descending order of bindingness – is *order* (命令), *instruction* (指示), *circular* (通知) and *opinion* (意见). In the list above, the nature of the document and month of publication or taking effect can be found in brackets.

1) 公司法 Company law, new version (*law*, took effect 1/2006)

2) 公司法 Company law, old version (*law*, 1999)

3) 反垄断法 Anti-monopoly law (*law draft*, under review)

4) 中央企业投资监督管理暂行办法

Central enterprises investment supervision and management (*temporary directive*, 7/2006)

5) 上海市国有资产收益收缴管理试行办法

Trial directive on Shanghai city state assets revenue and dividend management (*trial directive*, 11/2005)

6) 上市公司股权分置改革管理办法

Directive on listed companies' share structure reform (*directive*, 2005)

7) 上市公司收购管理办法

Directive on the takeover of listed companies (*directive*, 9/2006)

8) 地方国有资产监管工作指导监督暂行办法

Temporary directive on the guidance and supervision of local state assets management work (*temporary directive*, 5/2006)

9) 企业国有资产监督管理暂行条例

Interim regulations on the management of enterprise state-owned assets (*regulation*, 5/2003)

Other administrative regulations

10) 国有资产监督管理委员会令

State assets supervision and management committee (*order*, 4/2006)

11) 国务院关于试行国有资本经营预算的意见

State Council opinion on the trial State Assets Management Budget (*opinion*, not yet published)

12) 外国投资者并购境内企业暂行规定

Regulations on foreign mergers and acquisitions (*temporary stipulation*, 9/2006)

13) 国务院关于机构设置的通知

State Council circular on organizational set-up (*circular*, 3/2003)

14) 关于上市公司股权分置改革的指导意见

Guiding opinions on the share reform of listed enterprises (*opinion*, 8/2005)

15) 关于上市公司股权分置改革中国有股股权管理有关问题的通知

Circular on some issues related to the management of state-held shares in the reform of listed enterprises' non-tradable shares (*circular*, 9/2005)

16) 行政单位国有资产管理暂行办法

Provisional measures on the management of administrative organs' state assets (5/2006)

17) 外国投资者并购境内企业暂行规定

Provisional measures on mergers and acquisitions of domestic enterprises by foreign investors (*temporary stipulation*, 4/2003)

18) 关于推进国有资本调整和国有企业重组的指导意见

Guiding opinion on encouraging transformation and restructuring of the state-owned capital (*opinion*,

12/2006)

19) 关于企业国有产权转让有关事项的通知

Circular on matters relating to the enterprises' transfers of state-assets (*circular*, 12/2006)

20) 外商投资产业指导目录

Catalogue for the guidance of foreign investment industries (*order*, 11/2004)

Policy papers

21) 国民经济和社会发展第十一个五年规划纲要 (草案)

Guidelines for the 11th five-year plan (3/2006)

22) 中国利用外资‘十一五'规划

The 11th five-year plan for China's use of FDI (11/2006)

23) 钢铁产业发展政策

Steel industry policy (2005)

24) 船舶工业中长期发展规划

Shipping industry plan (2006; details not yet published)

25) 国务院关于加快振兴装备制造业的若干意见

Proposals for equipment manufacturing industry (6/2006)

Appendix 3 Major national science and technology programs

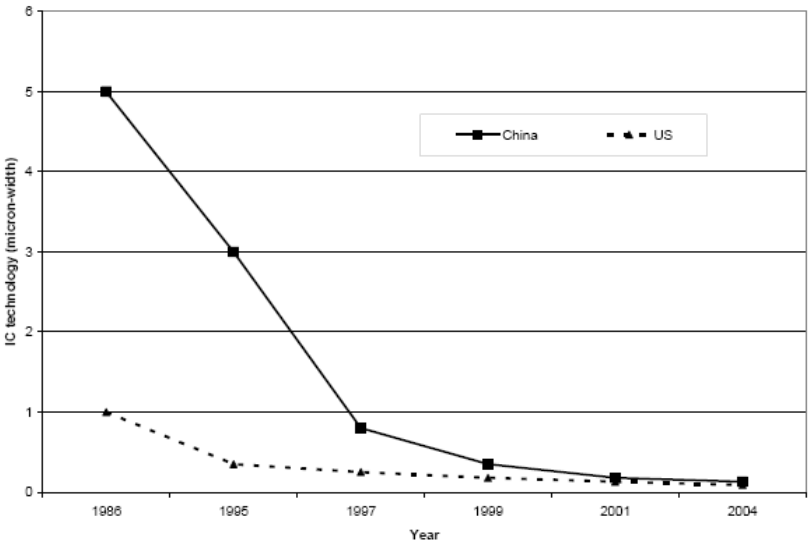
Program	Year started	Focus and Objective	Funding (100 million)		Performing sector (%)		
			Total	State share	Univ	RIs	Firms
Climbing	1992	Basic research	17.02	95.02	24.8	75.2	0
"863"	1986	Catch-up with the West in selected areas of fundamental and frontier research	1,004.21	52.05	29.8	35.6	28.7
Key Projects	1982	Applied research and development to meet critical technological needs in key sectors of the economy	2886.52	42.24	16.2	46.9	27.1
Torch	1988	Commercialization of new technologies; entrepreneurship through incubators and science parks	28993.04	1.77	0.7	3.0	95.3
Spark	1986	Diffusion and adoption of technologies in rural China	14752.67	4.14	0.2	4.5	87.9
NNSF	1986	Basic and applied research	1004.01				
NKL	1984	Basic and applied research	950.12				
Extension	1990	Diffusion and adoption of new technologies	4011.73	6.28	0.8	5.0	81.9

Note:

NNSF: National Natural Science Foundation *NKL: National Key Laboratories*

Univ: Universities *RIs: Research Institutes*

Appendix 4 A Schematic Description of Us-China Semiconductor Technology Gap



Us-China Semiconductor Technology Gap

Source: Gao (2002)