Chinese Enterprises: Innovation and intellectual property rights

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1. Innovation of Chinese Enterprises: situation and features

1.1. Progress, but still a long way to go

1. Enterprises has given greater attention to innovation.

- Increasing expenditure on Research and Development (the rate of R&D/GDP was 1.1% in 2002, 1.3% in 2004 with enterprises spending up to to 60% on R&D.
- Patents filings are increasing.
- Most large and medium-sized enterprises have established institutions specializing in R&D.
- Some enterprises have comparatively great innovative capacity.
- Innovation is rising.
- Innovation is centered around imitative innovation, improvement innovation and integrated innovation.

	1995	2004
Research and Development expenditure（100 million Yuan)	349	1843
R&D/GDP（%）	0.6	1.35

Data source: China Statistics Yearbook

1. Innovation of Chinese Enterprises: situation and features

1.1. Progress, but still a long way to go

2. Chinese enterprises are comparatively weak in terms of innovation capacity.

- Limited range of products.
- Insufficient investment. R&D as a percentage of GDP was 1.3% in 2004, compared with 3% in Japan.
- R&D expenditure in IT in most major enterprises is approximately 2-3%, small in comparison to 7-8% in many foreign enterprises.
- China has only a limited number of invention patents, and few “important” patents.

3.Environment for enterprises innovation is being formed.

- Importance of enterprise innovation is now widely recognized, the result of stiffer competition after China’s entry into the WTO.
- A basic intellectual property rights system has been established.

1. Innovation of Chinese Enterprises: situation and features

1.1. Progress, but still a long way to go

4.Great industry differences still exists.

- Some enterprises have a good foundation and strong innovation capacity(such as iron and steel, petroleum)
- Some enterprises have less innovation, and probably require 10-20 years for growth in their innovative practices.
  - ➢Unit enterprises, featured by formed force equipped with innovation capacity.
  - ➢Enterprises with assembling and efficient systems, featured by “doing while learning”, have innovative capacity after they have grown.
    - In the communication industry, the entry point for innovation is fairly high, and innovation is fostered because innovation benefits corporate profitability.
    - In the motorcycle industry, the entry point for innovation is mid-level, and innovation is more limited because profits are restricted due to competition.
    - Innovation by Chinese auto manufacturers is comparatively weaker in auto joint ventures.
  - ➢ Assembling and general enterprises, featured by “doing while learning”, have advantages in channels and manufacture, but carry with them “structural change risk” (such as TV)

Industrial technology, market features and positions of representative industries

	Industrial technology features	ChineseMarket Scales/Growth/starting point	Chinese Representative Enterprises and Comparison: Chinese Representative Enterprises	Proportion of Scales%	Technology Development	Complex
Iron and Steel industry	Device, maturity, easy to abtain	Greatest, high, midium starting point	Baogang Steel Group.	62.3	Comparatively high level	Comparatively good
Petroleumand Chemicals Industry	Device, comparatively mature, easy to obtain generally	Leading, high or comparatively high, high starting point	China National Offshore Oil Corporation	24.9	Midium or comparatively high level	Comparatively good
Cars	Comparatively Complicated assembling, mature body(great change in some parts), difficult to obtain	Leading, very high, high starting point	Shanghai Automotive industry Group	8.5	Midium level	comparatively weak
Power equipment	Complicated assembling, change fast, difficult to obtain	Leading, High, High starting point	Orient power corporation	18.5	Midium level or comparatively high level	midium
Communications	Complicated assembling, change fast, difficult to obtain	Leading, High, High starting point	Huawei	17.1	comparatively high or high level	midium
IT terminal	Assembling, is changing, difficult to obtain					
TV		Greatest, Fast, midium starting point,	TCL	91.9 (8.2)	midium	midium
PC		Greatest, very fast, midium starting point	Lenovo	24.2	high	midium
IT device liquid crystal display	Complicated equipment, change fast, difficult to obtain	Great market, low quantity products, grow fast,high starting point	BOE	5.7	from midium level to high level	weak

Data source: Chen Xiaohong 2007

1. Innovation of Chinese Enterprises: situation and features

1.2 Investigation of enterprise innovation: performance and strategy

Investigation of 2655 enterprises in 6 industries (DRC and National Statistics Bureau)

1. Innovation is prevalent, especially in medicine and communication equipment industry.
2. Both product and technology innovation have been valued, but there is more product innovation than technology innovation.

Enterprises Technology Innovation in the recent 3 years(surveyed in2006, %)

	Product Innovation	Technology Innovation
Total	79.7	74.8
Medicine	87.0	85.2
General Equipment	83.4	78.9
Specialized Equipment	77.6	71.5
Transport	78.4	64.3
Electric Appliance	76.9	74.9
IT	78.6	77.6

Data source: relevant investigations by Development Search Centre, the State Council and National Bureau of Statistics

1. Innovation of Chinese Enterprises: situation and features

1.2 Investigation of enterprise innovation: performance and strategy

3. Enterprises innovation strategies are changing, first in advanced enterprises.

- From imitative innovation to a higher level of integrated innovation and improvement innovation.
- From internal innovation to cooperative innovation and internet innovation.
- Increasing investment on innovation.
- Increasing emphasis on intellectual property rights and standards.

4. One-half of innovation is imitative and 1/3 self-innovation.

- Imitative innovation relies on reverse engineering, leading to no new achievements.
- Self innovation includes few principle innovations; integrated innovation and improvement innovation become the main parts of self innovation.

1. Innovation of Chinese Enterprises: situation and features

1.2 Investigation of enterprise innovation: performance and strategy

5. Innovation capacity is still at comparatively low levels.

- R&D investment as a % of sales income is 1% higher than levels of 10 years ago (0.6%-0.7%), but still low.
- Product innovation consists of 65% in new enterprise innovation, 58% domestic innovation, and 5% international innovation.
- Increasing emphasis on intellectual property rights and standards.

6. Inside innovation accounts for the lions' share, and cooperative innovation is gaining in importance.

- 83% of funding for innovation is supplied by enterprises' working capital 83%, while 51% is from loans and 24% from local government assistance.
- 80.6% of innovation development is done solely by industries themselves, while 42% of that is cooperative with universities and research institutions.

1. Innovation of Chinese Enterprises: situation and features

1.3 Industry Alliance survey: enterprises cooperative innovation

1.Increasing emphasis on cooperative innovation among Chinese enterprises

- Background
  - Chinese enterprises are comparatively weak in their innovative capabilities.
  - Innovation risks such as technology risk and market risk are increasing.
- Two directions have appeared.
  - Active cooperative innovation among enterprises, i.e. cooperation among competitors.
  - The government organizes multiple enterprise innovation.

2.Industrial alliance in Zhongguancun Science and Technology Park

- Upstream and downstream enterprises and competitors have formed industrial alliances.
- There were 26 industrial alliances in Zhongguancun Science and Technology Park at the end of 2006
- A survey of 20 industrial alliances by DRC shows hi-tech and ICT industrial alliances account for the lions share.
- Diversified goals of industry alliances

Goals	Market	Industrial Chain Cooperation	Social Rules	RD Cooperation	Technology Standard
Quantity	12	5	1	1	1

1. Innovation of Chinese Enterprises: situation and features

1.3 Industry Alliance survey: enterprises cooperative innovation

3. Industry alliance cases: Flush Alliance(Intelligent Grouping and Resource Sharing)

- The goal is to realize family 3C（computer, consumer electronics & communication devices） internet standards and related technology development.
- Proposed by Lenovo, and joined by Hisense, TCL, Konka, Great Wall, Rainbow and other ICT industry companies, founded in 2004 with 13 core enterprises and 86 diversified member companies.
- achievements
  - Intelligent Grouping and Resource Sharing becomes final committee proposals of ISO/IEC
  - 1.6 million Intelligent Grouping and Resource Sharing products of various kinds passed in 2006.

4. Explanation for the situation

- “Patent pool” and standards are important in ICT industry.
- Chinese enterprises have begun to value joint innovation.
- Some large-scale enterprise leaders.

1. Innovation of Chinese Enterprises: situation and features

1.4 Why have enterprises begun to value innovation?

1. Market-oriented innovation mechanisms gradually established in enterprises.

Before the mid-1990's enterprises were more concerned about development than innovation.

- State-owned enterprises faced great challenges, and private enterprises were even less capable.
- Relatively low expectation for innovation success.
- Development strategy that focused on imitation.

There has been an increasing emphasis on innovation in enterprises since the mid 1990s.

- The problem of economy "shortage" has been solved.
- A market economy has been initially established.
- Development of state-owned enterprises such as iron and steel, petroleum and power companies.
- Development of excellent private enterprises and shareholding enterprises, such as communication and PC companies.

1. Innovation of Chinese Enterprises: situation and features

1.4 Why have enterprises begun to value innovation?

2. Other Influences

- Changes in understanding: i.e. China is a “processing nation” rather than “manufacturing nation”
- Requirements by foreign companies
- Changes and influences of state strategies and policies
  - Innovation has been valued greatly since 1995
  - Clearly defined ” market orientation, enterprises entities and the integration of production, teaching and research”
  - Advocating policy for promoting innovation
  - Major hi-tech research and development programs

1. Innovation of Chinese Enterprises: situation and features

1.5 Advanced enterprises cases

1. Huawei

- Basic information
  - Private communication equipment manufacture company founded in 1988
  - Income estimated at 15 billion USD in 2007, with over 60% comes from export.
  - Products of Huawei cover transmission, exchanges, and mobile communication.
  - Provider of internationally known leading products.
- Successful experience in innovation
  - Market-orientation.
  - Research and development investment accounts for over 10% of income, and the company owns over 30% of its R&D facilities.
  - International cooperation is valued and global R&D resources are utilized.
    - ✓ Cooperative companies: IBM, Siemens, TI, NEC
    - ✓ Global research institutions includes five in China and four others located elsewhere.
  - Progress of administration and process is valued, such as introduction of IPD systems.
  - China's environment: growth opportunity and human resource condition etc.

1. Innovation of Chinese Enterprises: situation and features

1.5 Advanced enterprises cases

2. Dongfang Electric Corporation

- Basics
  - State-owned power equipment manufacturing Co. Ltd., Founded in 1950s
  - Annual income was 20 billion Yuan in 2006, increased by nearly 11 times over 2000.
  - Products include boiler, hydraulic turbine, steam turbine, power generators
- Major experience of innovation success
  - Research and development expenditure investment is comparatively high.
  - Favorable salary for R&D personnel since 1990.
  - Joint of domestic R&D and international cooperation.
  - Reform of state-owned enterprises: list on the stock exchange, financial structural readjustment, and divert employees.

1. Innovation of Chinese Enterprises: situation and features

1.5 Advanced enterprises cases

3. Others

- Different technology sources
  - Shanghai Baogang Steel, started by introducing and learning from Japan technology.
  - BOE, started by purchase of Carear companies.
  - Jinchuan Non-ferrous Metals Company owns creative unique technology of extracting nickel from mineral intergrowth.
- Common experience
  - Manager and entrepreneur with far reaching vision.
  - Value innovation investment and continuous study.
  - Value resource integration.
  - Integrate innovation strategy and development strategy.

2. Chinese intellectual property rights: basic situation and its influence on enterprises innovation

2.1 Chinese intellectual property system and situation

1. Plans to develop the legal system in line with international practices, but problems exist

- Complete legal system will be established in 20 years, and patent protection index will improve to levels of developed countries.

Patent protection index

	China	The U.S.A.	Japan	German	Korea
1985	2.18	4.19	3.94	3.71	3.61
2001	4.19	4.66	4.27	4.24	4.27

Data source: *China's Science and Technology Forum* by Yang Zhongkai etc. in 2005

- There is lenient regulation of IP rights, and lax antitrust rules.
- The legal enforcement system is characterized by an inability to readily adapt and its distracted resources.
- Weak legal enforcement and rampant local protectionism.

2. Chinese intellectual property rights: basic situation and its influence on enterprises innovation

2.1 Chinese intellectual property system and situation

2. Intellectual property rights are increasingly important, but China hasn't given sufficient attention and full utilization.

- China's patent application system is rapidly developing, being the world's fifth largest country to apply for patents.
- In terms of patent quantity, China ranks the 27th calculated by average population.
- 98% of enterprises haven't applied for any patents; regional differences exists.
- Low level of enterprise management of intellectual property rights.
- Low level of utilization of intellectual property rights.
- Increasing recognition of the relationship between intellectual property rights and standards, and its significance.
- Foreign companies attaches more importance to patent application in China, featured by country and industry concentration.
  - The top ten largest foreign companies having applied for patents in China prior to 2005 were from Korea and Japan, with one (Phillips) from Holland and one (IBM) from United States.
  - ICT is the key industry for patents application, followed by household appliances and machinery.
  - Only three local enterprises out of the top ten Chinese enterprises have applied for patents.

2. Chinese intellectual property rights: basic situation and its influence on enterprises innovation

2.1 Chinese intellectual property system and situation

3. New features of intellectual property rights

- Increasing emphasis on active protection.
- Increasing activities in intellectual property rights.
  - The quantity of patents is rapidly increasing, with 14 thousand and 476 thousand issued in 1985 and 2005, respectively.
  - Invention patents are increasing, but non-invention patents still account for the lions' share.
  - Increased recognition of the value of intellectual property rights, such as patent and trademark rights.
- The following principles will be considered in formulating state intellectual property right law.
  - Balanced benefits.
  - Innovation and fair competition.
  - International rules (Such as TRIPs)
  - classified guidance, service improvement and dynamic adjustment
  - Encourage enterprises to improve intellectual property rights strategy and management

2. Chinese intellectual property rights: basic situation and its influence on enterprises innovation

2.2 Some features of Chinese enterprises intellectual property rights strategy and administration

2716 enterprises, including 63% large and medium-sized enterprises and 41% high technology enterprises, were investigated in 2006 (SASAC, DRC). On average, each enterprise has applied for 38.5 patents, higher than the national average.

- 55.7% of enterprises have main products with patent technology.
- 25% of enterprises, accounting for 50% of sales of the total, own IP rights underlying their products.
- Patent technology comes from independent development and cooperative development.

IP Strategy	Have IP strategy	Some have IP strategy	Being formulated	Without IP strategy
Proportion %	13	22	28	37

2. Chinese intellectual property rights: basic situation and its influence on enterprise innovation

2.3 Cases: Shenzhen and Huawei

1. **Intellectual property rights situation in Shenzhen**
   - **China intellectual property rights development situation varies greatly from place to place, with Shenzhen being the leading area**
   - **Shenzhen enterprises Patent features**
   - Patents are mainly concentrated in industries, such as ICT, medicine, new materials and new energy, accounting for 80%.
   - Patents are concentrated in enterprises, and the patent rate by the top ten enterprises was 16.5% in 2001 and 34% in 2005.
   - Local enterprises such as Huawei, ZTE,BYD etc. have more patents.
   - **Shenzhen government attaches importance to intellectual property rights.**
   - The first city to publish Regulations on the Appraisal of Incorporeal Assets, Regulations on the Protection of Enterprises Technical Secrets and Administrative Measures of exchanging intellectual property for shares
   - The first city to publish city intellectual property rights outline(2006-2010)
   - Cases concerning intellectual property rights are actively accepted and handled by the courts.
   - “Shenzhen’s intellectual property protection leading group” is organized, and administration and enforcement of its laws is rigorous.
   - Patent agencies are developed. There were 22 patent agencies formed in 2005 with 190 professionals.
   - Enterprises training and communication is available through institutions such as intellectual property rights associations.
   - The government attaches importance to the establishment of national and global network to exchange information and improve IP protection.

2. Chinese intellectual property rights: basic situation and its influence on enterprise innovation

2.3 Cases: Shenzhen and Huawei

2. Huawei

- Regard intellectual property rights strategy and management as an important part in enterprises development strategy and technology innovation strategy.
- Clearly defined basic and enforceable patent strategy.
- Many methods to obtain IP adopted (independent research and development , cooperation, purchase, M&A).
- strict intellectual property management system established.
- Talented people of intellectual property rights with over 100 intellectual property rights professionals by the end of 2006.
- Accumulate experience gradually: such as compromise of lawsuit between Huawei and Cisco.

Thanks!