



PATENTED IN CHINA

THE PRESENT AND FUTURE STATE OF INNOVATION IN CHINA

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**CHINA'S ECONOMY
HAS SHIFTED FOCUS,
MOVING AWAY FROM TRADITIONAL
AGRICULTURE AND MANUFACTURING
TOWARD INNOVATION-
ORIENTED ACTIVITIES.**

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INTRODUCTION

The 2008 Beijing Olympic Games had, as a stunning backdrop, China, whose meteoric growth has attracted attention and curiosity from around the world. As the increasing wealth of the population and improved standards of living offer visible signs of the country's development, major changes have also gone on behind the scenes. China's economy has shifted focus, moving away from traditional agriculture and manufacturing toward innovation-oriented activities. Since the Chinese economic reform started in 1978, China has emerged from a poor developing country to become the second-largest economy in the world after the United States (U.S.)¹

More recently, the Chinese government has encouraged the country to embrace innovation through a variety of measures. It has increased the overall research and development budget for the country, introduced tax breaks and monetary incentives to increase indigenous innovation and continued investing in the nation's academic institutions, which have become a driving force behind Chinese patenting.

In just 20 years after the country's Patent Law took effect in 1985, China has become the third-largest patent office in the world by annual invention patent applications, after the U.S. and Japan. From 2003 to 2007, China's GDP grew at an average annual rate of 9.75% while Chinese invention patent applications grew at an average of 34.36% per year. If current trends continue, China is set to dominate the patent information landscape in the not-too-distant future.

This report takes a look at current patent trends and speculates about how the world of patent information will look in five years. The driving factors for China's patent boom are analyzed using data drawn from Thomson Reuters. Patent volumes and trends are explored, as well as the underlying causes of increased innovation in China, including economic and government policy factors.

¹ The World Fact book, United States Central Intelligence Agency (CIA), March 20, 2008.

PAST PERFORMANCE

The patent offices of the U.S., Japan, Europe (EPO), Republic of Korea and China account for 75% of all patents filed and 74% of patents granted worldwide.² An analysis of patent volumes over the last five years from these five major offices shows that inventions from China have been growing at a faster rate than any other region.

There are several attributes that can be measured to identify and track innovation trends in a particular region:

- **Total volume of patents.** This gives a measure of the total patenting activity in a region that involves two aspects – those inventions patented first in a region (basics) and those other inventions for which protection is sought in order to manufacture, use or sell the invention or products in the region (equivalents).
- **The basic patent volume.** This gives a clearer measure of home-grown innovation by providing a measure of how many inventions are patented first in the region.
- **The ratio of basics to total volume.** This is a broad indication of inventiveness of a region compared to how attractive it is perceived to be as a market by both home-grown and external industry.

Using data from the Thomson Reuters value-added patent collection Derwent World Patents Index (DWPI), the trends in patenting according to the above measures are compared for the U.S., Japan, Europe (EPO), Republic of Korea and China.

² "WIPO Report Shows Internationalization of Patent Trends", World Intellectual Property Office, Press Release 463 Geneva, October 16, 2006.



TOTAL PATENT VOLUMES 2001 – 2007

Exhibits 1 and 2 show the five patent offices' total patenting volume annually from 2001 to 2007 and in aggregate during the same period. Japan has the highest total patent volumes year to year during the period, but its lead narrows as the U.S. catches up.³ Europe and Korea have similar volumes and growth trends. The striking difference among these regions is China – from humble beginnings, it is experiencing the most rapid growth and has surpassed Europe and Korea since 2005. In aggregate, China, Korea and Europe are on par with one another, each accounting for 12% of the group's total.

³ The large growth in volume of US patents from 2001-2002 may be explained by a change in US law at this time, allowing publication of patent applications 18 months after filing where previously publication only occurred on grant of a patent. Only a proportion of applications proceed to grant – those that were not granted would hitherto have been invisible.

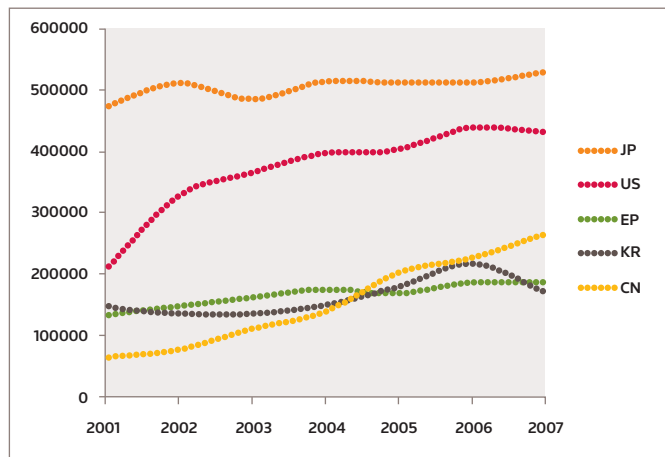


Exhibit 1

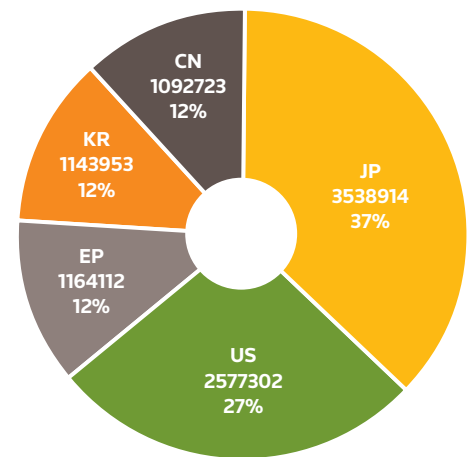


Exhibit 2

BASIC PATENT VOLUMES 2001 – 2007

Exhibits 3 and 4 depict the trends of basic volume for the regions in the same time frame year to year and in aggregate. Japan's basic volume again ranks the highest overall but is slowly declining. Parallel to the trend by total volume, the U.S. once again is steadily narrowing Japan's lead. Volumes of basic patents for Korea are higher than for Europe. Once again, we see China exhibits strong growth moving from last position in this group to third over the period, exceeding both Europe and Korea in 2007.

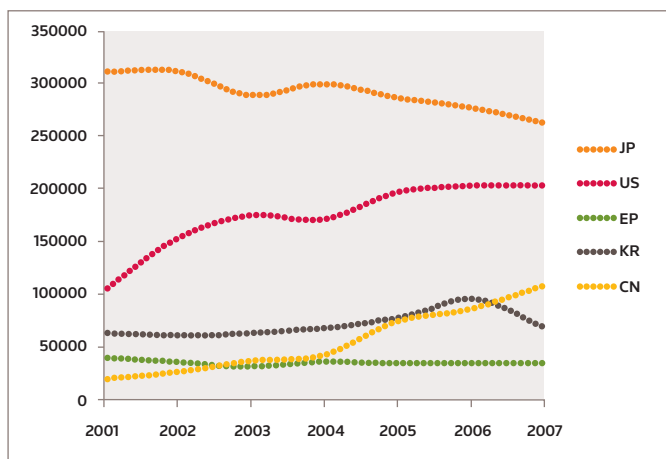


Exhibit 3

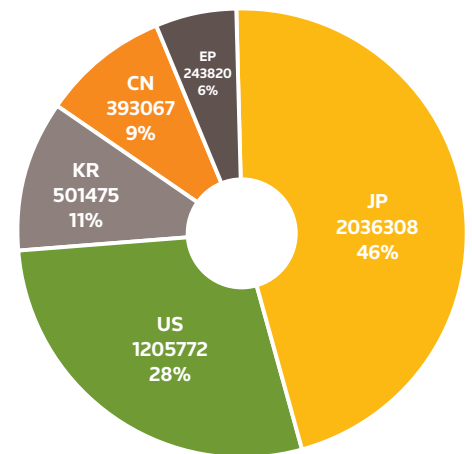


Exhibit 4

The two-year gap in China's lead over Europe and Korea between the total patent volume and the basic patent volume is worth noting (Exhibit 5). The China basic patent volume didn't exceed Europe and Korea until after 2006 while the China total volume overtook Korea in 2004. Obviously, China's growth rate relative to Europe and Korea has been more rapid in total volume than that in basic patent volume. There are two implications. First, China has been a hotbed for patent applications originated elsewhere, which pushes up the total volume. Second, China has ramped up domestic inventions, which boost the basic patent volume.

The shares of Europe and China in aggregated total volumes (both at 12%) are noticeably greater than that in aggregated basic volumes (9% and 6%). This reflects a high level of manufacturing and/or marketing interests in the regions by external entities, which enlarge the regions' share in the aggregated total volumes.

THE TWO-YEAR GAP IN CHINA'S LEAD OVER EUROPE AND KOREA BETWEEN THE TOTAL PATENT VOLUME AND THE BASIC PATENT VOLUME IS WORTH NOTING

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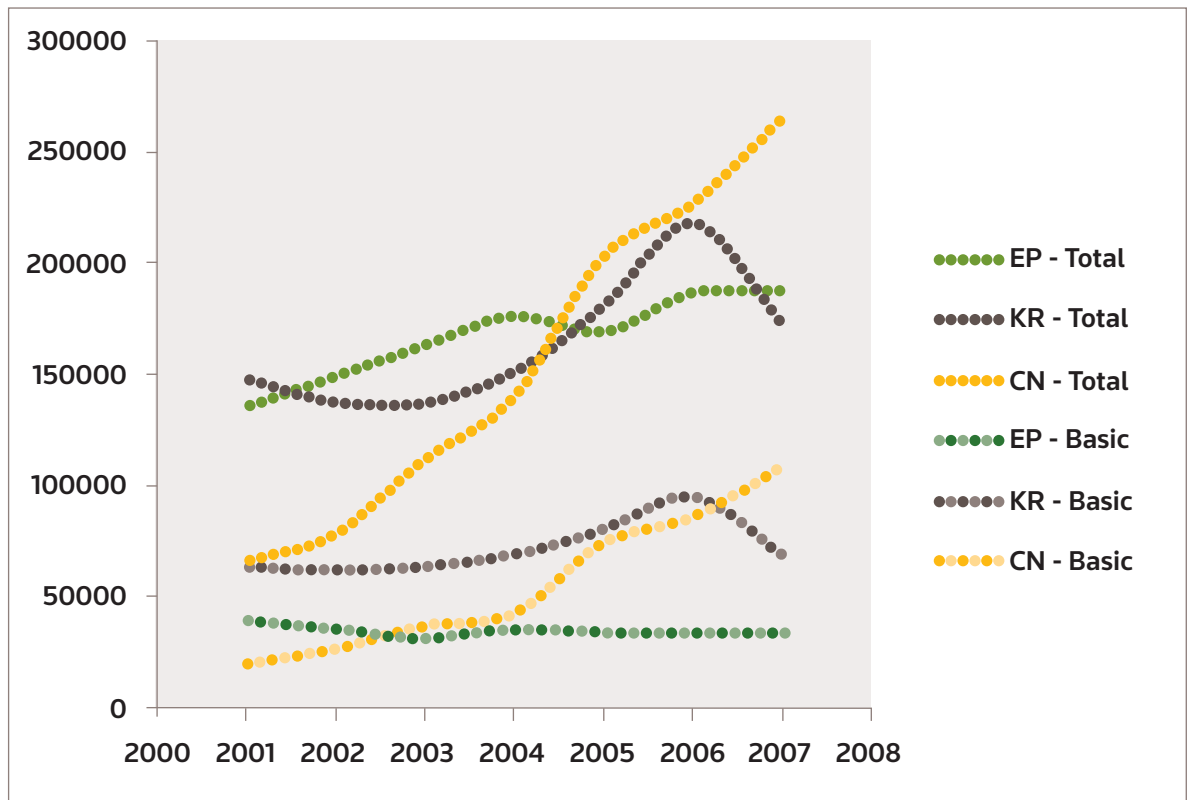


Exhibit 5

BASIC VS. TOTAL PATENT VOLUME

The ratio of basic patent volume to total patent volume generally reflects patenting entities within the region, so the higher the ratio, the more filings by domestic concerns compared to external interests. As shown in Exhibit 6, the basic to total ratio ranges from the lowest of 18.1% in Europe in 2007 to the highest of 65.5% in Japan in 2001.

Japan shows a high proportion of basic to total patents indicating a predominance of filings by domestic concerns; however there is a steady downward shift each year. Japan's basic patent volume tumbles from around 66% in 2001 to just below 50% in 2007.

The U.S. is relatively stable in the ratio of basic to total patent volume, indicating that the upward trend is evenly fueled by both domestic and foreign concerns. Europe and Korea both display a varying degree of declining percentage of basic to total patent volume. By contrast, China is the only region in the group where the proportion of basics is growing steadily, from less than 30% in 2001 to more than 40% in 2007. Clearly, the domestic concerns are growing at a more rapid pace than foreign entities behind the Chinese patent boom.

Ratio of Basic Total	2001	2002	2003	2004	2005	2006	2007	Average
JP	65.5%	60.9%	59.4%	58.2%	55.9%	54.2%	49.5%	57.5%
US	49.8%	46.6%	47.8%	43.0%	48.6%	46.2%	47.0%	46.8%
EP	29.4%	24.0%	19.2%	20.3%	20.2%	18.1%	18.1%	20.9%
KR	43.2%	45.3%	46.5%	45.6%	44.1%	43.4%	40.0%	43.8%
CN	29.7%	33.6%	32.8%	30.2%	36.4%	37.8%	40.7%	36.0%

Exhibit 6



LOOKING FORWARD

Given the trends observed here, it is difficult to resist a bit of crystal-ball gazing and to speculate about the patent landscape in the not-too-distant future. Although strictly a mathematical exercise, it is interesting to observe the predictions on this basis.

Using the average annual growth rate from 2002 to 2007 (Exhibit 7) and a straight-line projection approach, we can see that the U.S. is set to surpass Japan in 2009 (Exhibit 8). China is set to surpass Japan in 2011, and then the U.S. in 2012.

The predictions from looking at volumes of basic patents projected into the future are broadly similar although the timescale is somewhat shorter (Exhibit 9). Again, the U.S. is set to overtake Japan in 2009, but here China overtakes first Japan a year earlier in 2010, and then the U.S. one year earlier in 2011.

Region	Average Total Volume Annual Growth Rate	Average Basic Volume Annual Growth Rate
JP	2.0%	-2.7%
US	14.4%	13.0%
EP	5.6%	-2.4%
KR	3.8%	2.6%
CN	26.8%	34.3%

Exhibit 7

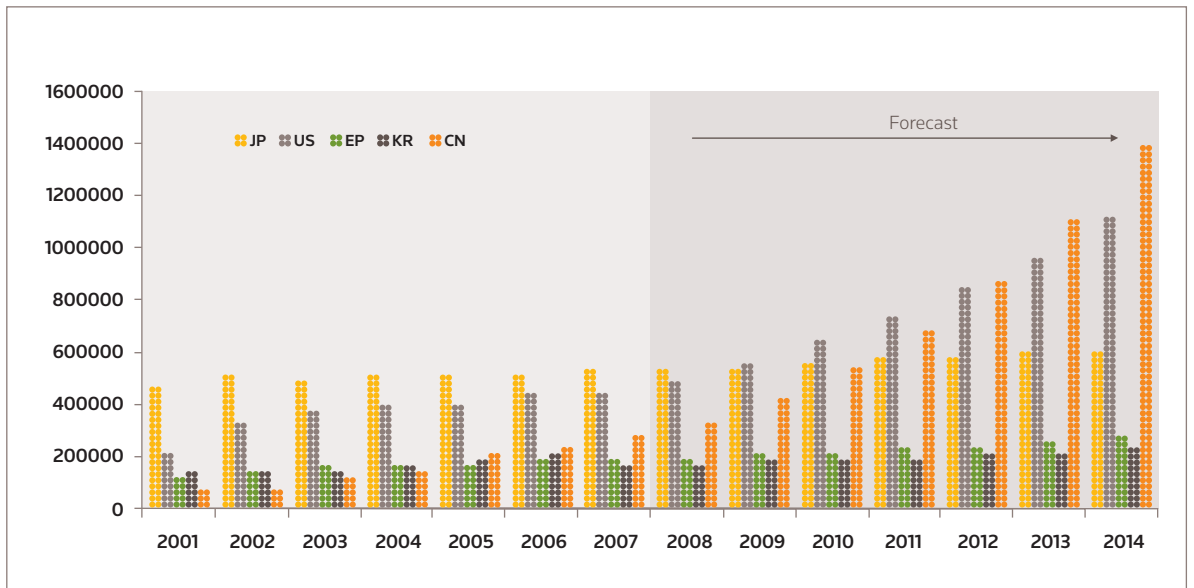


Exhibit 8

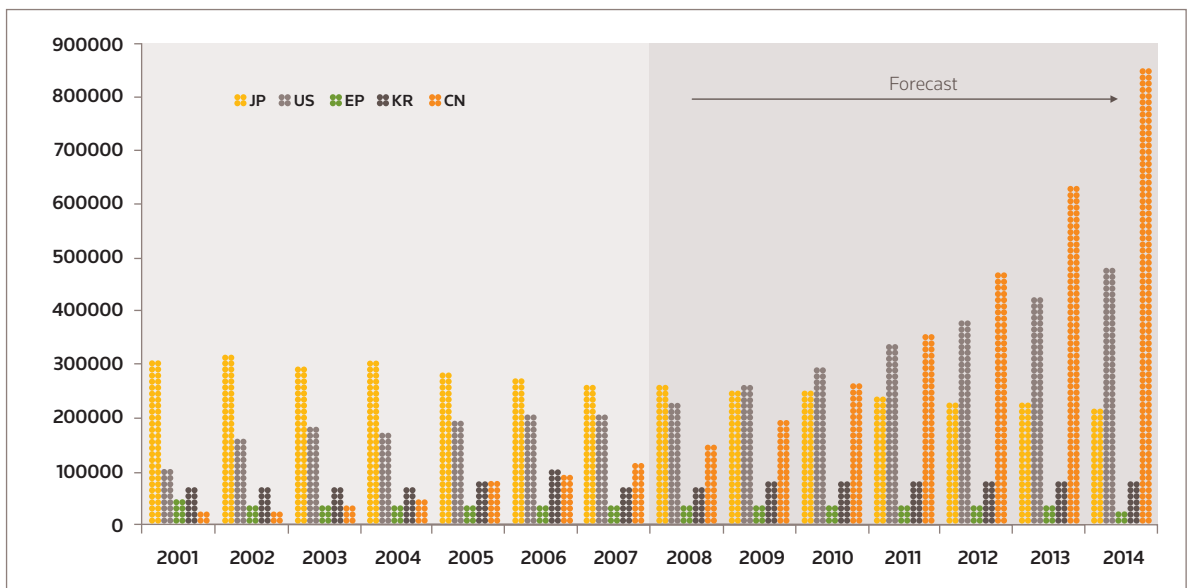


Exhibit 9

THE DRIVING FORCES BEHIND CHINA'S PATENT BOOM

DOMESTIC VS. FOREIGN PATENT APPLICATIONS

Exhibit 10 depicts the number of annual Chinese patent applications by domestic and foreign applicants, according to State Intellectual Property Office (SIPO) statistics.⁴ Both groups have trended upward. However, domestic applications grew at a more rapid pace and outnumbered foreign applications in 2003. Furthermore, margins between domestic and foreign applications have gotten wider over the last three years.

There are three phases between foreign and domestic applications: foreign outnumbered domestic from 1996 to 1999; foreign and domestic nearly reached a tie from 2000 to 2002; and foreign trailed domestic from 2003 onward. In 2006 and 2007, domestic applications exceeded foreign ones by as much as 28% and 40%. Such differences are especially impressive because they were accomplished on a base of approximately four times that when the foreign applications were greater in number. Innovations by domestic entities unquestionably have become a mainstream driving force and will continue to shape China's patent landscape.

⁴ Data compiled from statistics released by SIPO, http://www.sipo.gov.cn/sipo_English/statistics/index.htm.

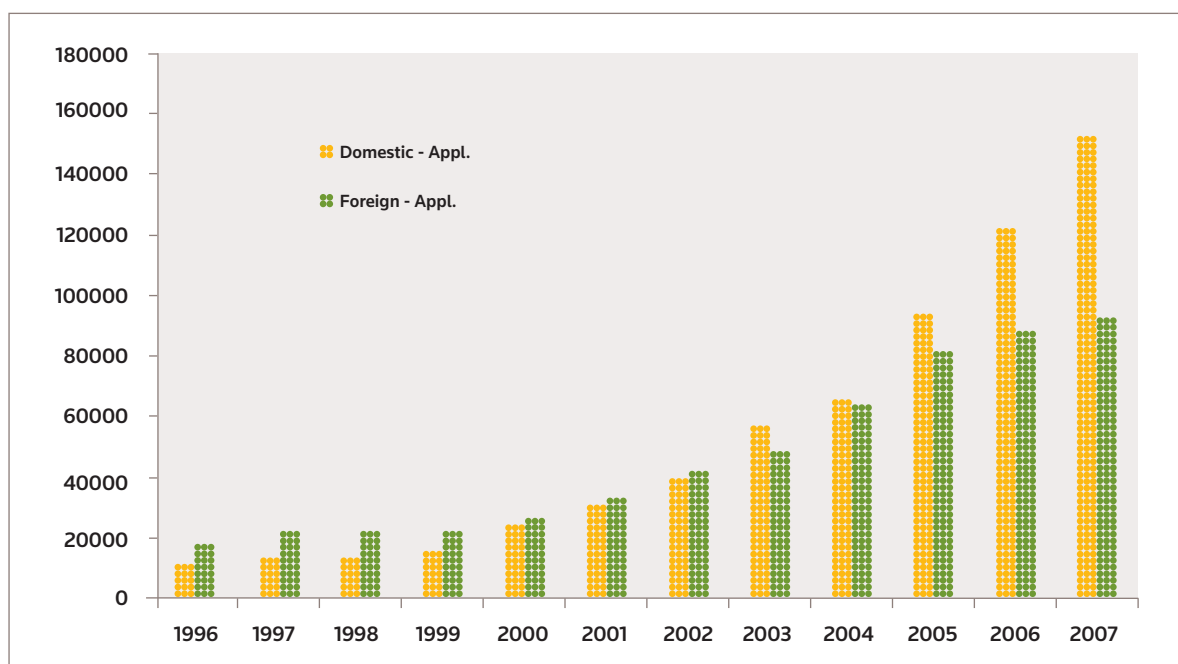


Exhibit 10

CHINA'S INVENTION PATENT APPLICATIONS OVERSEAS

In the 2006 Chinese 11th Five Year Plan for national economic and social development, the Chinese government highlighted innovation as a focus along with social harmony, environment, macro-economic balance, and governing the market.⁵ The country's science and technology plan articulates the ambitious goal of China becoming an "innovation-oriented" society by the year 2020.⁶ Since then, China has considerably expanded its overseas invention patent applications. Exhibit 11 demonstrates that from 2006 to 2007 the growth rates of China's overseas filings in the U.S., Europe and Japan patent offices were up by 9.9%, 58% and 29.9%, respectively. This outpaced the growth rates of 6%, 3.7%, and 3% by all applicants in these offices.⁷ Given the amazing track record in the home office, China likely will sustain its overseas patenting activities to augment the country's ability to compete in global markets, despite that its overseas filings overall have been on a smaller scale.

On the other hand, China is tightening requirements for multinational companies conducting R&D in China. A new amendment will require foreign companies making discoveries in China to file for patents first in China, or risk losing legal protection for their intellectual property there.⁸ If international companies fail to file patent applications in China first for discoveries made from their local research centers, they may not be able to substantiate any subsequent patents in China and protect sales in the local market from competitors. The proposed amendments could become law in the not too distant future, which would further boost invention registrations in China.

⁵ "Abstract of the Eleventh Five-Year Plan outline," People's Daily Online, March 8, 2006.

⁶ "Innovation Tops Hu Jintao's Economic Agenda," Xinhua News, October 15, 2007.

⁷ "Dramatic Increase of Overseas Invention Patent Applications in China in 2007," SIPO press release, March 11, 2008, http://www.sipo.gov.cn/sipo_English/news.

⁸ "China proposes changes to foreign company patent rules – report," Thomson Financial News, July 3, 2008.

Patent Office	Overseas Invention Applications by China in 2007	Increase from 2006 by China	Increase from 2006 by all Applications
US	4140	9.9%	6.0%
EP	1136	58.0%	3.7%
JP	656	29.9%	3.0%

Exhibit 11



SHIFT OF TECHNOLOGY FOCUS

On a worldwide scale, China's patent portfolio seems to parallel the other major patent countries/regions by technology profile. Using statistics on worldwide patent activities released by the World Intellectual Patent Office (WIPO) in 2007,⁹ we compare China with the remaining four major patent offices in selected technologies (Exhibit 12) and illustrate China's contribution in the worldwide environment (Exhibit 13).

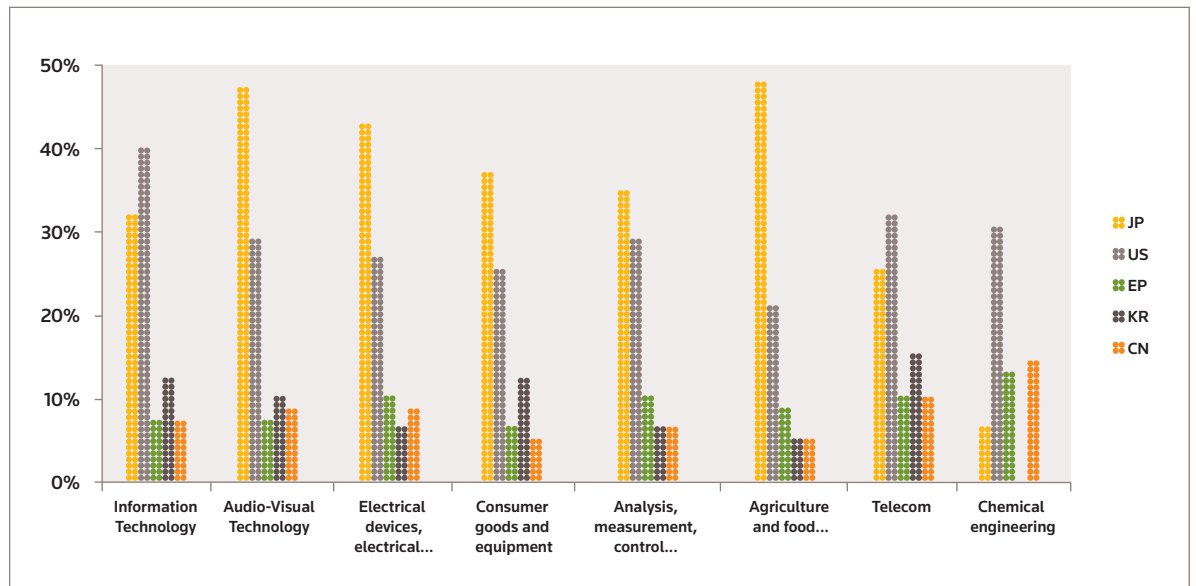


Exhibit 12

Field	Worldwide Patent Applications 2000-2004	Worldwide Growth Relative to 2000	China Records 2000-2004	China's Worldwide Share	China's Worldwide Ranking
Information Technology	1,610,938	28%	112,766	7%	5th
Electrical Devices, Electrical	585,230	13%	38,258	8%	4th
Analysis, Measurement, Control	556,655	20%	46,818	6%	5th
Telecommunications	541,788	12%	22,055	9%	5th
Audio-Visual Technology	478,231	28%	33,399	8%	4th
Consumer Goods and Equipment	441,094	12%	5,259	5%	6th
Chemical Engineering	245,589	-7%	48,761	13%	2nd
Agriculture and Food	105,186	5%	31,927	5%	7th

Exhibit 13

The general trends are: Japan and the U.S. compete for the top two spots except in chemical engineering where Japan is behind China and Europe. China ranks in the fourth or fifth position and is within close range of Europe or Korea in technologies, except for chemical engineering which is the largest segment in China's patent portfolio. In chemical engineering, China is in second place behind the U.S.

From a historical perspective, big technological changes took place in China's patent portfolio. Exhibit 14 compares the top five largest technologies (as defined by Derwent class) in Chinese invention patent applications between 1995 and 2005. In the span of eleven years, Digital Computers shifted from fourth to first with a growth rate of 3093%. Telephone and Data Transmission Systems and Computer Peripheral Equipment applications entered the top five in 2005 vs. being less significant in 1995. The top three technologies in 1995, Natural Products and Polymers, Foods and Food Treatment, and Fermentation Industry, were heavily oriented in food production, reflecting the economy at the time when feeding millions of people was the top priority, and foreign investment and the introduction of high technology were in their infancy.



Year	Top Five Fields	Patent Applications
1995	Natural products and polymers	1,854
	Other foods, food treatments including additives	1,209
	Fermentation industry	625
	Digital computers	584
	Refractories, ceramics, cement incl. mfg.	520
2005	Digital computers	18,649
	Telephone and data transmission systems	12,997
	Natural products and polymers	9,146
	Fermentation industry	5,334
	Computer peripheral equipment	4,838

Exhibit 14

As China's economy grew, its patent portfolio became more high-tech focused, resembling the developed countries' portfolios.

A closer look at the applicants reveals that there is still a considerable gap in areas of expertise between domestic and foreign entities: foreign entities lead domestic entities by a wide margin in high technology segments while domestic applicants still dominate food-oriented categories. For instance, foreign applications in digital computers grew at about twice the pace of that of domestic, resulting in 67% of the total in 2005 compared to 54% in 1995, even though tremendous growth was seen by the domestic group (Exhibit 15).

On the other hand, the shares between domestic and foreign applications remained largely unchanged for natural products and polymers in the same period in which domestic applications account for 90% to 91% of the total while both domestic and foreign applications expand by several folds.

Digital computers	1995	2005	Growth Rate
Total	584	19,340	3212%
Domestic Applications	269	6,355	2262%
Foreign Applications	315	12,985	4022%
Domestic Applications %	46%	33%	
Foreign Applications %	54%	67%	
Natural products and polymers	1995	2005	Growth Rate
Total	1,854	9,146	393%
Domestic Applications	1,700	8,195	382%
Foreign Applications	154	951	518%
Domestic Applications %	91%	90%	
Foreign Applications %	9%	10%	

Exhibit 15

GOVERNMENTAL POLICIES AND GOVERNMENT'S ROLE IN INNOVATION

R&D BUDGET

The Chinese government plans to dramatically increase R&D expenditure to reach the goal of 2.5 percent of GDP by 2020, compared to 0.6% in 1996 and 1.4% in 2006. In the same time, the government's economic plan targets a GDP growth rate exceeding 7.5 percent annually until 2010 and then 7 percent until 2020, yielding a huge increase of available R&D expenditure in coming years.¹⁰ A positive correlation exists between the number of patent applications and R&D expenditure by industry¹¹ and by country/region.¹² China's economic growth and liberal boost in R&D expenditure will continue to fuel its innovations.

TAX AND FINANCING

The Chinese government is allowing greater and easier tax deductions for R&D expenses, increased government-backed lending, and discounted interest rates to R&D investment.¹³ It seems inevitable that these vehicles will further push China's already stunning patent statistics to new heights in the coming years.

INDIGENOUS INNOVATION AND TECHNOLOGY STANDARD

Chinese premier Wen Jiabao stated that "Core technology cannot be bought. Only by strong capacity of science and technological innovation, and by obtaining our own IP rights, can we promote [China's] competitiveness and ... win respect in the international society."¹⁴ China's science and technology policy encourages "indigenous innovation" to improve homegrown creativities and to substantially reduce reliance on foreign technologies that largely dominate the high-tech and core technological fields today. Creating technology/product standards built on homegrown patents ensures royalty payments go to local inventors. This approach is particularly prevalent in telecommunications and electronics industries, impacting a range of products including cellular telephones, digital televisions, computer chips, video discs, digital cameras and next generation networks.¹⁵

¹⁰ "Technology Upgrading and China's Growth Strategy to 2020," Whalley and Zhou, 2007, 8–9.

¹¹ "Study on the Trend of Research and Development from Patent Application," NISTEP, Report No. 9.

¹² "Patents and R&D expenditure", Bernard FÉLIX, Statistics in focus - Science and technology, 16/2006.

¹³ "China's R&D Policy for the 21st Century: Government Direction of Innovation", Katherine Linton, <http://ssrn.com/abstract=1126651>, February, 2008.

¹⁴ "National Strategies and Policies for Innovation: A view from China and India", WPO Magazine, July 2007.

¹⁵ "China Standard Time," Greg Linden, Business and Politics, Vol. 6, Issue 3, 2004.



GOVERNMENT'S ROLE IN ACADEMIA AND ENTERPRISE

In China, almost all of the major academies, including universities, colleges and scientific research institutions, are owned by the government. A Thomson Reuters study found that the Chinese academic sector contributes a significantly higher proportion of patent applications to the national total compared to many other countries: 16% compared to 1% in Japan, 4% in the U.S., and 2% in Korea, respectively.¹⁶ The same study found that the only other country that has a high academic contribution similar to China is Russia. Both China and Russia are ruled by centralized governments where R&D project selection and funding are predominantly determined and controlled by the government.

Furthermore, the government also plays a significant and direct role in Chinese enterprises, even though this is a factor hidden from most statistics in China. In 2007 the governmental investment in about 150 of China's centrally administered state-owned enterprises (SOEs) reached 100 billion Yuan (14.27 billion USD) – 27% of national R&D total.¹⁷

MONETARY INCENTIVE

Providing government subsidies to domestic inventors and entities is a part of the policies administered by The Chinese Ministry of Science and Technology.¹⁸ Provincial and city governments who are eager to meet the central government's targets often allocate additional subsidies and reimbursements of fees to stimulate patent applications. In 2003, the Intellectual Property Office of one Chinese city specified grants of 10,000 Yuan to the owner of an invention patent that had been successfully registered in foreign countries or a maximum of 5,000 Yuan for a patent registered in China. In addition, the city government would fully reimburse the application and evaluation fees paid by the applicant, while the provincial government would grant another 50% subsidy based on the amount.¹⁹ Such incentives are substantial considering that the national average annual wage in China was 14,040 Yuan (2,003 USD) at the time.²⁰

¹⁶ "Analyzing Global Patenting Activity Using Strategic Intelligence and Competitive Analysis Information from Thomson Innovation, the New Standard in IP Research and Analysis," World IP Today, Thomson Reuters.

¹⁷ "China's central SOEs invest almost 100 bln yuan in R&D in 2007," Xinhua News Agency, July 8, 2008.

¹⁸ "Chinese Research Institutes Urged to Be More Patent-aware," Xinhua News Agency, May 13, 2003.

¹⁹ "Foreign Investors in Foshan Entitled to Patent Application Subsidies," Business Alert – China, February 3, 2003.

²⁰ "High TAR wages benefit the privileged," <http://www.phayul.com/news>, February 11, 2005.

PATENT QUANTITY VS. QUALITY

While Chinese patent statistics continue to make headlines, both government insiders and legal experts express concerns about patent quality. A recent article in the *Financial Times* indicates that the patent figures reflect a concerted government campaign to persuade Chinese companies to protect their intellectual property by law, and that government subsidies to cover patent application costs is a factor that artificially inflates the number of filings.²¹ Chen Naiwei, director of the Intellectual Property Research Centre at Shanghai Jiaotong University, echoed the view that many local governments have provided patent fees to enterprises and science institutes, resulting in the rapid growth in applications. Most patents filed in China are for a new design appearance or new models, which do not require great technical innovation, he adds.²²

The Chinese patent office permits three types of patents: invention patents that are similar to U.S. utility patents having 20 years of protection, utility model patents that have 10 years of protection, and design patents. The utility model patents are particularly popular with domestic applicants because they are easier and faster to prepare, do not undergo substantive examinations before being granted, and cost less.²³ For these reasons, utility model patents may be of substandard quality intrinsically.

For invention patents that undergo SIPO's examinations, there are a number of efforts and developments in place to manage quality. The majority of SIPO's more than 2,000 patent examiners have been trained by the EPO, with an additional 60 examiners per year undergoing training in various EPO centers. In the mid-1990s, SIPO adopted the EPOQUE system, an international search database for patents to facilitate shared standards of automated patent filing. In June 2007, SIPO and EPO entered a strategic partnership in which EPO will work closely with SIPO to secure Intellectual Property Rights in China and to further align the Chinese patenting system with international patenting practice.²⁴

Invention patents can be evaluated, at least in part, based on the success rate of granting from Chinese overseas applications. The results are yet to be determined and must be evaluated in the coming years.

²¹ "The value of branding becomes patent," *Financial Times*, July 2, 2008.

²² "China hits top three in patent applications," SciDev Net (<http://www.scidev.net/en/news>), August 15, 2007.

²³ "Patenting Landscape in China," Evalueserve, May 2008.

²⁴ "Background: EPO and SIPO move ahead to secure IPR," EPO new release, June 8, 2008.



CONCLUSION

Although the predictions of future patent application volume by the five major patent offices are purely mathematical exercises, the inescapable fact is that Chinese patents are here to stay and will continue to evolve into prominence. So what does this mean for those involved in the Chinese patent system?

For foreign companies doing business in China, the proposed amendments in patent law, which require local discoveries to be registered in China first, could have a major effect on their IP strategies. In addition, the flood of domestic inventions and the difficulties in discerning quantity from quality heighten the necessity of intelligence in analyzing and understanding what is really innovative.

For Chinese companies and institutions, being aware of prior art from developed countries to create new IP rights, especially in high-tech and core technologies, is essential.

For Chinese government agencies and quasi-governmental organizations at various central, provincial and local levels, identifying technology gaps and partners that can help to fill them is key to getting China's innovation engine on the right track.

For the information industry, both from the points of view of information providers and patent information professionals, the huge and rapidly growing volumes of non-Roman character patent information being published today, and in the future, pose one of the key challenges to be addressed.



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