

Perspectives for Managers

www.imd.ch

How should foreign technology firms pace their R&D investments in China?



Georges Haour

IMD Professor of Technology and Innovation Management.

His main area of work is on the challenge of effective value-creation through technological innovation. He recently published a book on this subject, "Resolving the Innovation Paradox." (www.innovationparadox.com)

Overview

China's economy is expected to grow at a rate of about 7 to 9% in 2005. Accomplishing massive transformations in its coastal regions, while remaining a developing country in its vast "hinterland," China is stepping up its transition towards the so-called "knowledge economy." This includes increased investments in R&D (Research and Development), estimated to be US\$ 60 billion in 2003.

Following Japan and Korea, China is using its dynamic manufacturing sector as the platform for stronger value-creating activities through product adaptation, and in due course, product innovation. By and large, China has already attained the latter stage in the telecommunications sector. Life sciences may well represent the next opportunity.

Attempting to exploit the potential of this huge market, foreign companies are making considerable investments in China, including R&D. However, in order to become an equal member of the world's R&D/Innovation community, China's current applications of intellectual property laws must fully conform to OECD standards.

China's economy is fast climbing the value chain

Largely fuelled by a substantial flow of FDI (Foreign Direct Investments) of US\$ 62 billion in 2003, compared to US\$ 121 billion to the USA, China's economy elicits great interest. Having joined the World Trade Organization in 2001, China is currently making another round of decreasing its import tariffs: taking the automotive sector as an example, the level of duties of 43.8% in 2001 will come down to 25% on July 1, 2006.

Emulating Japan, where several decades ago engineers and marketers in Tokyo and Osaka designed, manufactured and sold products such as cars, cameras, walkmans, which would conquer the world markets, China's "world factory" is now moving to higher-value activities. In this trajectory of development, the manufacturing of products leads to product adaptation through R&D, which in turn creates product innovation.

As a result, China's investments in R&D, public and private, have roughly tripled between 1998 and 2003, according to best estimates. Widely ranging numbers are proposed for China's R&D investments: between US\$ 14 and US\$ 70 billion per year, depending upon the source. A more realistic figure may be US\$ 60 billion, given by the Paris-based OECD (www.oecd.org). It is not clear how this estimate should be split between private firms and China's large public sector of SOEs, the State Owned Enterprises or government laboratories. This amount already represents a third of what the USA invest in R&D each year, but is still only 1% of China's Gross National Product, a level encountered in most developing countries. Taking the crude indicator of the yearly R&D investment per capita, the numbers are US\$ 10 for China versus US\$ 25 for Korea. As is often the case for R&D, input numbers are one thing, but what really matters is the effectiveness in transforming these investments into commercial successes.

Taking the example of electronics industries, it is anticipated that China will manufacture half of the entire world's output in this sector by 2008 or so. Chinese companies in this area include the PC maker Lenovo, with sales of US\$ 3 billion in 2003. China's rapid ascension in this sector is illustrated by the US\$ 2 billion Chinese firm TCL, which has become the world's first manufacturer of TV sets, following a deal with

“For any industrial sector, China’s market size and spectacular economic growth represent a mesmerizing attraction for foreign firms.”

the French company Thomson Electronics in 2003. The resulting company now has a yearly production of 18 million units, far ahead of SONY and Philips, while currently China turns out a total of some 30 million sets each year. In chip making, recently established companies such as SMIC have aggressive growth targets. China thus challenges Taiwan’s position in this area, occasionally even hiring Taiwanese managers to lead the growth of this industry.

In the ICTs, Information and Communications Technologies, China has moved up the value chain aggressively. Bypassing fixed telephone lines, China is the world’s largest market for mobile telephony, with 235 million subscribers in 2003. In this area, China is the world’s most dynamic market for cellular phones, with yearly growth rates of 10-15% during the 2000-2003 period. China is using its muscle to impose its own preferred technical standards, thus pushing R&D activities and innovations specific to this market, but liable to diffuse to other countries. China’s largest operator in this area, China Mobile, has a yearly turnover of close to US\$ 13 billion, while telecommunications equipment maker Huawei, with sales of US\$ 5.5 billion in 2004, recently secured a US\$ 10 billion credit line from the China Development Bank in order to finance overseas expansion.

Non-Chinese firms R&D investments in China

In recent years, Western technology firms have wanted to become players in this active scene. In particular, the Chinese ICT sector has seen considerable foreign R&D investments. In the recent past, close to 40% of these investments went to joint-venture firms, but the trend now is rather to invest in wholly-owned subsidiaries, whenever possible.

As an example, in early 2004, Motorola, one of the largest investors in China, had 1600 persons employed in the 19 centers of its China Research and Development Institute, which was established in Beijing in 1999. With five R&D units totalling 600 persons in China, Nokia is expanding its Product Creation Center in Beijing, while telecom equipment maker Ericsson is completing a plan to invest US\$ 600 million in China between 2002 and 2005.

In the ICT area, investing in R&D in China is a necessity. To start doing it only now is already

late. This is not only because of the sheer size and dynamism of this highly competitive sector, but also due to the fact that China has become the world’s innovation driver in this sector.

The healthcare and medical sectors also represent considerable potential for growth. Again, the logic of the population size and economic growth makes it likely that by 2010 the Chinese market will grow from the present US\$ 10 billion to become the fifth market in the world. Also, the country’s pool of talent in life sciences is considerable: it is estimated that close to 200,000 researchers are currently involved in biotech R&D work in China. The country is leading in specific areas of gene therapy: an example is the anti-neck-and-head cancer drug Gendicine, commercialized in early 2004. A specific feature of China’s scene is that public opinion in this area appears to show little reluctance about issues such as gene technologies, in contrast to US and European societies where occasionally heated and irrational fears hamper scientific work.

In all, many features make China a high-potential market in the healthcare area. As a result, Swiss drug-maker Roche opened an R&D unit in Shanghai in 2004. That same year, the Danish Novo established a collaboration with 60 staff at Beijing’s Tsinghua University. Building on century-old traditions, the effects of Chinese herbal medicine are currently studied by various pharmaceutical companies, using genome research.

In the engineering sector, participating in the buoyant market encouraged companies such as elevator maker Schindler to set up R&D activities in Shanghai more than 15 years ago. In this way, the company was able to benefit from a situation where the dynamic building sector was less risk-adverse, as is the case in times of robust growth, hungry for novel features and prompting local innovative developments, which would eventually be used elsewhere the world.

With similar logic, Bosch, following the rapidly growing car manufacturers General Motors and Volkswagen, who already are among China’s largest foreign investors, plans to make R&D investments of 600 million Euros in the country within the next two years.

For any industrial sector, China’s market size and spectacular economic growth represent a mesmerizing attraction for foreign firms. Large

non-Chinese firms have rushed in, to be in a position of some day profitably participating in this dynamic scene. When it comes to R&D/Innovation, a knowledge-intensive activity par excellence, there is, however, an additional attraction: China offers a considerable pool of talent, while having a general high esteem for technological or scientific pursuits. The country's university system counts some of the world's leading institutions. Each year in China, three times the number of engineers graduate compared with the USA and 14,000 PhD degrees are given. In addition, there is a diaspora of 600,000 Chinese students abroad, with an increasing percentage of them returning to China soon after graduation in order to participate in growing opportunities, in a reverse "brain drain," just like Taiwan experienced in recent decades.

Trends on the national scientific scene look reasonably encouraging, if one is to believe the statistics on China as being one of the very few countries to have increased its share of the world's scientific publications: from 1% in 1995 to 3% in 2000. This should be compared with China's "rival" India, for which similar statistics indicate a slight decline from 2.1% to 1.9% in the same period.

Interestingly, the asset of access to technical talent was rarely invoked in the case of Japan in the "roaring 1980s." Then, the rationale for foreign firms to do R&D in Japan was not so much to tap into the local talent, but rather to be able to adapt to this fast growing, quality-demanding market.

The presence of foreign organizations and management is a sign that China is catching up with the standards of the innovation process encountered in the world's most industrialized countries. Not surprisingly, managing R&D and technological innovation constitutes an area of growing interest. Most likely, China will soon innovate in the process of managing technical innovations, as well as contributing advances in the content of scientific and technological endeavours. A recent special issue on this topic in the Journal of R&D Management illustrates this interest. (www.blackwellpublishing.com)

In all, it is estimated that more than 200 foreign firms currently have an R&D presence in China. The size of these units range from small "observation posts" to fully fledged arrays of R&D laboratories employing several thousand

staff. Townships and provinces actively compete to attract such investments. Tax incentives, infrastructure projects, administrative fast tracks are used to seduce investors. The country's business center of Shanghai is proclaiming itself a future world hot-spot for life-science, competing with other cities such as Beijing, which, in addition to being close to government and leading universities, enjoys a somewhat less volatile manpower situation.

In the future, the pace at which companies will make R&D investments depends largely on one set of issues around Intellectual Property (IP). Indeed, this is particularly valid for the life sciences.

Intellectual Property in China

At different degrees depending on the sector, China has all the ingredients for robust value creation through technological innovation. But will the "mayonnaise take?" As China is closing the economic gap with the OECD countries, will the country attract foreign investments to help its transition from the "world's factory" to a "global fountainhead of innovation?"

Whether China becomes a world player in technological innovations crucially depends on the way it deals with Intellectual Property (IP) issues. China formally joined the World Trade Organization in December 2001, with the attendant IP regulations of TRIPS -- Trade Related Issues relating to Intellectual Property. China has ratified the corresponding treaties since the Paris Convention in 1984, but its familiarity with the IP area is recent, since its patent office was opened only in 1985.

It is estimated that more than 5% of world trade involves counterfeit goods, and this results in Japanese companies losing close to US\$ 35 billion each year. In Asia, Singapore has been most determined to secure a solid IP framework, while relentlessly enforcing the law. China, on the other hand, is a major source of counterfeit products. In its 14 July, 2004, resolution 576, the US House of Representatives deplored "the continued existence of widespread IP rights violations in China."

Chinese officials frequently underline how vital a solid intellectual property infrastructure is for their country. Indeed, China's legal framework for IP seems to be "state of the art," if one takes the industrialized Western practices as a

"Whether China becomes a world player in technological innovations crucially depends on the way it deals with Intellectual Property (IP) issues."



“China will increasingly benefit from professional outsourcing, as the rest of the world taps into the considerable technical talent available there.”

standard. In particular, this concerns the 2000 Patent Law, with a “first to file” rule, the 2001 Copyright Law and the 2004 Regulation on Custom and Protection for IP. Crucially important, however, is the way this WTO-driven IP legal arsenal is actually put into practice. Most often, the various provincial courts handle patent litigations involving non-Chinese firms in ways that are rarely in favour of the latter. In the particularly IP-sensitive pharmaceutical sector, this is tantamount to turning ethical drugs into generics overnight for the potentially promising Chinese market. Recent cases, involving Pfizer and AstraZeneca, are not encouraging in this regard.

Conclusions

Primarily to serve this seemingly insatiable market, companies from higher-income countries will continue to massively invest in production in China, provided that qualified labour, materials, parts and stability are in adequate supply. China may thus become the paradox of a world flooded with goods, but possibly incapable of producing enough food for its inhabitants, since it is expected that in 2030 the world’s population will require three times the current food production levels.

In parallel, China will increasingly benefit from “professional outsourcing,” as the rest of the world taps into the considerable technical talent available there. India is another contender, with the well-known Bangalore-based, large IT companies Infosys and Wipro, as well as fast growing drug companies such as Ranbaxy and Dr. Reddy. India indeed presents the advantages of the English language and of a legal system highly compatible with the currently dominating Western way of doing business.

With regard to innovation, following the current period of consolidation of R&D investments in technology-intensive sectors, non-Chinese companies are expected to somewhat align the size of their R&D presence with their sales volumes, just like US multinational companies developed R&D units in Europe in the 1960s. This time, the shift may be more rapid, so that the

prospect that R&D investments will level Europe and the USA, while growing at a healthy rate in large overseas markets such as China or India. This seems particularly to be the case in China’s telecommunications sector.

The caveat is indeed the IP situation: if carrying out R&D in China results in substantial leaks of innovation-based competitive information, R&D investments will be channelled elsewhere. Technology firms must carefully monitor IP practices in the field, particularly in the life sciences area. A key incentive for making the IP scene a “level playing field” is likely to come from domestic technology firms. The already mentioned Huawei company invests 10% of its sales in R&D each year. As it grows overseas, such Chinese technology companies will want comparable patent protection at home and abroad.

But overall, the combination of China’s large, innovation-prone and fast-growing markets, together with the availability of its substantial pool of engineering talent, are likely to constitute too much of an attraction for non-Chinese technology firms to resist.

IMD

P.O. Box 915, CH-1001 Lausanne,
Switzerland

Tel.: +41 21 618 0342

Fax: +41 21 618 0715

info@imd.ch

<http://www.imd.ch>

Editor: Roger Whittle

© IMD, April 2005. No part of this publication may be reproduced without written authorization.

