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China's Indigenous Innovation Policy: Impact on Multi-national R&D

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Multinational corporations seeking access to China's burgeoning consumer markets and human resources are establishing R&D centers in the country and developing ways to thread a path through its complex innovation policies.

Recently, the growth of R&D in emerging economies such as Brazil, Russia, and particularly India and China, has captured the attention of researchers.¹ Collectively called BRIC economies, these large and growing markets also produce many relatively low-cost scientists and engineers. To develop products for these markets, and to tap their skilled human resources, multinational corporations (MNCs) are setting up R&D labs in these countries and in some cases outsourcing R&D activities to local firms.

China has a strong desire to learn from MNCs, while developing domestic companies that can compete globally and reduce China's dependence on foreign intellectual property (IP). The resulting indigenous innovation policies have raised alarm among MNCs, which complain that these policies can be arbitrary and unfair to foreign companies.²

Based on a review of the literature and interviews conducted in China in 2009, we asked the following questions:

- What are the objectives of China's indigenous innovation policies, and how is China translating these objectives into specific regulations and initiatives?
- What factors influence MNC R&D activities in China, and what is the impact of China's indigenous innovation policies?
- How do MNCs manage R&D in China within the context of their global organizations?

The answers to these questions offer an introduction to China's innovation policies and the R&D activities and strategies of foreign MNCs in China.

EMPIRICAL RESEARCH

We studied China's indigenous innovation policies, and the decisions and activities of major MNCs in the information and communication technology industry in China. We also interviewed a dozen R&D executives at five large US MNCs, executives of IT industry associations, and US government officials in China.

Table 1 provides background information on each of the MNCs. We do not reveal company names at their request.

CHINA'S INDIGENOUS INNOVATION POLICIES

China is now the leading manufacturer of many electronics products, assembling advanced PCs, mobile phones, networking equipment, and other high-tech goods. Yet only a few Chinese companies are globally competitive in any of these industries, and MNCs or Taiwanese companies produce most exports. As a result, although China plays a major role in the global IT industry, it captures a small share of the profits in the value chain.³

China's government leaders want to move into higher value activities such as R&D, particularly the development

Table 1. Background information for companies in the study.*

Characteristic	MNC 1	MNC 2	MNC 3	MNC 4	MNC 5
Industry sector	Computers, software, and services	Computers	Software	Semiconductors	Mobile communications
No. of employees in China	20,000	> 10,000	4,000	7,000	10,000
No. of R&D employees in China	6,000 total; 300 PhDs	< 100 researchers plus interns and postdoctoral candidates	2,000 total, 250 in research labs	> 1,200 hardware and software engineers	1,000 to 2,000

* From company documents and interview notes.

of new products and advanced technologies.^{4,5} Starting in the mid-1980s, China instituted a series of policies to promote domestic technology development for commercial markets.⁶ These policies helped domestic enterprises and promoted innovation in the PC, electronics, software, integrated circuit, and telecommunications equipment industries.

China's five-year 2006 to 2010 plan further targeted the information industry by focusing on indigenous innovation. It emphasized

- developing domestic standards and technologies,
- promoting innovation in IT products, and
- supporting domestically owned technology firms.

At the same time, China announced a 15-year “Medium-to-Long-Term Plan for the Development of Science and Technology,” which called for the country to become an innovation-oriented society by 2020 and a world leader in science and technology by 2050.⁷

A statement by Zhang Dejiang, a member of the Political Bureau of the Communist Party and vice prime minister, captures the motivation behind these policies (www.miit.gov.cn/n11293472/n11293877/n13702866/n13702883/14206919.html):

Under the guidance of Decisions of Accelerating the Growth and Development of Strategic Emerging Industries, it is important to enhance the policy support and strengthen the capability of indigenous innovation, especially to make the IT industry to be the leading industry. ... It is also essential to continue supporting TD-SCDMA [time division synchronous code division multiple access, a standard], and encourage the industrialization and internationalization of TD-LTE [time division, long-term evolution].

Promoting domestic standards and technologies

China seeks to develop IP and core technologies, and views technical standards as crucial to its success.^{8,9} It has been working hard to push Chinese standards as international standards. For example, the government selected TD-SCDMA to be the 3G mobile standard of China Mobile

(China's largest mobile carrier), and the International Telecommunication Union has approved it as a global standard.^{6,10}

The government clearly uses the standards-setting process as a tool to support domestic companies. Establishing domestic standards reduces the competitive advantage of MNCs, which use technologies based on international standards.

MNCs have been involved in some Chinese standards initiatives, such as TD-SCDMA, the Audio Video Standard (AVS), and the Intelligent Grouping and Resource Sharing (IGRS) protocol, a home networking standard.¹⁰ But MNCs are not involved in other standards, such as the Wireless LAN Authentication and Privacy Infrastructure (WAPI). It would be fair to say that China sees the importance of participating in global standards bodies as well as the value of involving MNCs in its own standards forums.

In the longer run, China seeks to become a leading player in international standards bodies, but plans to do so from a position of internationalizing its own national standards as well as localizing international standards.¹⁰ The MNCs realize that they will need to adopt China's standards in some cases if they want to participate in the Chinese market, so they attempt to influence those standards when possible.

The desire to promote domestic standards rather than just adopt international standards might put China behind in adopting some technologies. For example, its promotion of TD-SCDMA for 3G mobile phone service and the decision to require China Mobile to adopt the standard left China years behind other countries in rolling out 3G mobile phone service. Yet the government was willing to pay that price to promote a domestic standard and ensure that domestic equipment manufacturers such as Datang, a state enterprise under the China Academy of Telecommunication Technology, would have a leading role in the 3G market.¹⁰

Promoting domestic innovation

To promote domestic innovation, the government offers tax incentives and other financial benefits to domestic and foreign firms that set up R&D centers in China. To be eligible for these benefits, firms must seek certification, which means they must

- register in mainland China (which does not include Hong Kong, Macau, and Taiwan),
- engage in R&D,
- develop independent IP in core technologies, and
- file patents in China.⁹

Most certified firms are domestic companies, as the requirements are problematic for foreign firms. According to one interviewee, the head of an IT industry organization, “There are some high-profile cases where companies left China or chose another location in Asia, such as the Philippines, because of the IP laws and certification requirements.” Other MNCs conduct R&D in China without receiving certification or the associated incentives.

The government also adopted measures to speed technology development and transfer, including financial support, tax incentives, IP protection, and domestic R&D centers. It also required more technological investments from MNCs, including R&D centers that engage in research collaboration with local researchers and institutions. Our interviews indicate that China anticipates that domestic researchers in these collaborations will have access to advanced technologies from the MNCs.

China’s indigenous innovation policy gives preference to domestic companies in procurement by government agencies and state-owned enterprises.

Supporting domestic firms

China’s indigenous innovation policy gives preference to domestic companies in procurement by government agencies and state-owned enterprises. Regulations state that “If government departments purchase software related to national sovereignty or economic security, they should follow the procedure of government procurement” and give preference to local companies.⁹

China also promotes national champions to act as a counterbalance to the market power of MNCs in specific sectors; it also encourages these champions to become innovators capable of competing globally.² As one interviewee said, “China’s strategy is to create one strong player in each industry segment and to build them up to dominate the China market and prepare them to go global. They do not care about creating competition among local companies, and they want to protect these companies from foreign competition.” However, having national champions does not mean that these sectors are competition free. For example, Huawei competes at home and abroad with ZTE in networking equipment, while Lenovo, China’s leading PC maker, faces both domestic and foreign competitors in

the PC market. Even favored state enterprises often face competition in the sectors they dominate.¹¹

Bureaucratic competition in policy implementation

Although outsiders might see China’s government as a unified actor making policies that affect the MNCs, the reality is much different—the state’s role can be ambiguous and is not always unified.¹⁰ Several central government institutions implement indigenous innovation policies; each institution has different agendas, as do provincial and city governments.⁴

The key central government agencies are the Ministry of Science and Technology (MOST), the National Development and Reformation Committee (NDRC), and the Ministry of Education.² The Ministry of Industry and Information Technology (MIIT) is a key agency in the information industry. The Standardization Administration of China (SAC) leads in developing standards policies. According to interviewees, there is inconsistency and sometimes conflict among central government agencies. This might reflect not only institutional rivalry, but also the personalized nature of many policy processes in China, which only increases the level of uncertainty and ambiguity in policy outcomes.⁴

Policy objectives can also differ between the central and local governments. For example, the central government sets the certification criteria that define a high-tech company, whereas local governments certify individual companies. MNCs seek high-tech certification because it reduces the corporate income tax from 25 to 15 percent. For certification as a high-tech company, an MNC’s local subsidiary should perform R&D and file patents in China. However, most local governments mainly want jobs and have been willing to certify MNCs as high-tech companies without strict adherence to the criteria. As one interviewee stated, “Local governments are not fussy about what they label as R&D in their reports to the central government, so a wide variety of activities end up being called R&D.”

As another interviewee stated, “The local governments are under pressure to stimulate high-tech industry, so they attract companies that appear on the surface to be doing high-tech work although in reality they might not be doing so. Although the central government is concerned about the long-term impact and the development of indigenous R&D, local governments are not.”

The result of competition among localities for investment and jobs is the emergence of a regionalized high-tech industry, with major regions specializing in different aspects of production and innovation.⁴ For example, Beijing hosts MNCs and domestic firms specializing in software development and is the home to many MNC R&D labs, as well as Lenovo. The industry is concentrated in the Zhongguancun Science Park, a development supported by the central and Beijing municipal governments.¹²

The Shanghai area hosts several MNC R&D labs and is home to both MNCs and domestic semiconductor and telecommunications companies. Shanghai's municipal government has played a key role in developing science parks and promoting the local IT industry.⁴

The Pearl River Delta in southern China hosts the largest concentration of hardware manufacturing, including the massive Foxconn campus near Shenzhen, which makes products for Apple, HP, Dell, Intel, and others. It is also home to China's greatest homegrown high-tech success story, Huawei, a network equipment company.

FACTORS INFLUENCING R&D DECISIONS

Key factors influencing the location of MNC investment in overseas R&D include a large domestic market, availability of low-cost R&D manpower, and the scale of national technology capabilities. There is no clear evidence that R&D incentives offered by foreign governments have an impact on R&D intensity or that adverse policies (such as inadequate patent protection or restrictive trade regimes) affect the attractiveness of a country for R&D.¹³

Our interviews support prior research by showing that MNCs are attracted to China primarily by the size of the domestic market and the availability and low cost of R&D talent.¹⁴ However, China's technological capabilities do not appear to be an important attraction; its perceived weak protection of IP rights might limit the types of R&D activities conducted there.

Domestic market

The size and growth rate of China's economy make it a unique attraction for MNCs, leading them to make concessions that they might not make in other markets. For example, China has as many mobile phone users as the combined populations of the US and the European Union (about 800 million), and has an estimated 538 million Internet users. China's economy is larger than the combined GDPs of the other three BRIC economies. A continuation of the double-digit growth of the past three decades could make China the world's largest economy in less than 20 years.

At the same time, it is difficult for foreign companies to enter China's market. Obstacles include inadequate physical and financial infrastructure in many places, lack of enforceable commercial laws, weak IP protection, heavy competition from domestic firms with lower costs, and an array of government restrictions on the activities of all companies, particularly foreign companies. In the words of one interviewee, "Policy is everything and is arbitrary. One day you can do [a type of] business, the next day they say, 'Sorry, you can't.'"

Despite these issues, the Chinese market is so attractive that MNCs must be there. The representatives of four of five MNCs we interviewed mentioned market access as a major reason for locating R&D in China. The fifth men-

tioned market growth as a reason for manufacturing in China, and cited specific market opportunities for product development in the country.

How does this market potential translate into a need for R&D in China? One factor is understanding market needs. One general manager stated that "China is valuable for R&D because the economy is huge and growing bigger, and the customers have unique [scale] requirements. By being in China, we can gain an edge over competitors because we understand these requirements better than others."

The Chinese market also has some characteristics that create novel R&D opportunities for MNCs. For example, China bans sales of most videogame consoles, and only a few retail outlets sell games. Instead, consumers can download games from government-approved websites. One company said that this created a potential market for technology that accelerates downloads and leads to performing related work in its China R&D lab.

Key factors influencing the location of MNC investment in overseas R&D include a large domestic market, availability of low-cost R&D manpower, and the scale of national technology capabilities.

Another interviewee pointed to the potential for research opportunities that take advantage of the vast amount of data that certain events can generate in China, such as Web traffic during the 2008 Olympics. For technologies such as large-scale data mining or managing network capacity during huge spikes in traffic, China can serve as a unique research environment.

R&D talent availability and cost

Access to China's large pool of science and engineering graduates is a major factor for most MNCs locating R&D in China. China's universities and colleges produce an abundance of graduates in science and engineering. Although most of these graduates are not of the caliber that MNCs require, MNCs select from the cream of the crop—the top 0.5 percent, according to one company, or the top 10 schools, according to another.

Competition for talent has increased as more MNCs enter the market, along with Taiwanese and mainland Chinese companies. According to several interviewees, state-owned enterprises, once unattractive to talented graduates, now offer competitive salaries and better benefits—such as subsidized housing—compared with MNCs. In addition, the prestige of working for an MNC has somewhat diminished.

This competition has led to salary increases, especially for experienced scientists and engineers, as well as for managers. Although competition is becoming more intense

and salaries are increasing, the quality of graduates has also improved.

One interviewee said, “People used to get PhDs in two to three years. No research methodology, just theory. Now the education system has improved. They have numerous professors with degrees from the US and experience in US universities. The gap is much smaller than it was.”

The biggest shortage is in middle managers and higher-level leaders who can run a project or an entire division. There are few people with 10 to 15 years’ experience in China, and bringing experienced personnel from the US is expensive. Salaries for people with 15 years’ experience are comparable to those in other locations such as Ireland or Israel, according to one interviewee. One solution to finding experienced people is to hire Chinese nationals who have studied and worked in the US or other locations to manage teams in China.

Although MNCs might look for incentives or subsidies, the bigger motivation is to gain favor from government officials.

Despite increased competition and cost, as well as shortages in some skills, the availability and quality of science and engineering talent is clearly a major attraction for firms doing R&D in China. Cost is mentioned less often, but it is an advantage. To be clear, although salaries are rising in China, there is still a huge gap compared with the US. As of 2005, a newly graduated computer engineer in China could expect to start at \$7,500 to \$10,000 a year, while in the US, the figure was around \$60,000.¹⁵

INFLUENCE OF CHINA’S POLICIES ON MNC STRATEGIES

China’s policies in general have a major influence on the decisions of MNCs to locate R&D in China. As one interviewee said, “Most companies are doing only as much as the government forces them to. Market access requires doing R&D in China.”

Although MNCs might look for incentives or subsidies, the bigger motivation is to gain favor from government officials. In the words of a former R&D director for a major MNC, “The main reason that MNCs come to China is cheap labor, but it is also to have influence with the government so that these companies can participate in large Chinese government procurements or in the consumer market. If companies play the game right, they can get considerable help from the government in many different forms.”

China’s indigenous innovation policies seem to have a

weaker and mixed effect on MNCs. Companies are generally unhappy with some requirements, but have been willing to expand their R&D activities in China in spite of those concerns. When incentives are available, they seek certification as high-tech companies. In general, they do better with local governments than with the central government.

A US official said, “The central government offers subsidies to domestic companies for indigenous development of technology. But there is no clear definition of what a domestic company is.”

The policy of requiring IP registration in China for firms that desire treatment as domestic companies is a major concern to some MNCs, less so to others. This difference might relate to differences in the firms’ strategies, whether they seek incentives, or the extent to which they focus on the government and SOE markets.

According to one interviewee,

Registering IP in China doesn’t fit with a global operations model, where R&D is done in a unified way. How do you justify having some part of it coming from China, and how do you protect it if you do define some part as from China? The business issue is this: Do the benefits of licensing in China, like tax benefits, potential sales, goodwill with the government, outweigh the IP risk?

On the other hand, another US MNC said that it had obtained certification as a high-tech company. The company indicated that the Chinese government defined the criteria in advance, and the company reports performance every year. This company has made a major commitment to China as a manufacturing and product development location, as well as a market, so potential tax incentives are especially valuable.

Some MNCs have been more aggressive in challenging China’s policies and trying to involve the US government. Others try to keep a low profile and avoid possible retaliation from the Chinese government. The most visible and contentious issues in the past have been over IP protection—for example, from software piracy—standards setting, and content censorship.

MNCs were successful in acting together to challenge MIIT’s 2009 order that all new PCs come with Green Dam software installed to block certain Internet content. The MNCs argued that this was an unreasonable requirement, and eventually MIIT dropped the requirement. This success came largely because the MNCs allied themselves with Chinese PC makers and consumers, and with the US and other governments. In contrast, Google shut down its mainland China search engine for a time after being unable to resolve censorship issues. In this case, the US government was powerless to influence China’s position in spite of criticism from the US secretary of state.

Table 2. Motivation, activities, and management of China R&D.

Characteristics	MNC 1	MNC 2	MNC 3	MNC 4	MNC 5
Factors influencing R&D location in China					
Key motivations for R&D in China	Market access, understand market, influence policy, access to talent	Market access, understand market needs, access to talent	Win government favor and support for IP protection	Market access, low-cost talent, be a "good citizen"	Win government favor, develop China as major market, tap local talent
MNC interaction with the local innovation system					
Local partnerships	University-focused: hire talented students, joint projects	Joint R&D projects with universities	Industry and university focused, outsourced software development	Joint R&D projects and education programs	Industry focused
IP policies	IP managed globally	IP managed globally, share IP from joint projects	IP managed globally	IP managed globally, share IP from joint research	IP registered in China and globally if developed in China
Response to indigenous innovation policy	Try to influence and shape policy behind the scenes	Does not seek treatment as domestic company	Developing local outsource suppliers, attract R&D to China	Built a fabrication plant, increased R&D activity	Certified as high-tech company for lower tax rate
China R&D strategy					
R&D activities in China	Development and testing for global teams, localization	Localization, potential to develop technology for global market	Research and develop technologies for global business units	Develop extensions of existing technologies for local market, possible use in other markets; testbed for unique conditions	Development for local market, development and test for global projects
Management control	Limited control, decisions made in US or elsewhere	Limited control, decisions made in US	Independent projects, integrated into global projects; business units are all represented in China lab	Matrixed organization reporting to local management and corporate teams	Lead some global projects, compete with other global labs

In the case of indigenous innovation, US MNCs made a major issue of discrimination in the procurement aspects of the policy and obtained support from the US government in negotiating with China on the issue. Possibly as a result, the Chinese government announced changes in its policy during President Hu's state visit to Washington in January 2011. Specifically, the Chinese promised to delink indigenous innovation from government procurement (www.reuters.com/article/idUSTRE70J7RL20110121).

The White House described the agreement as follows (www.whitehouse.gov/the-press-office/2011/01/19/fact-sheet-us-china-economic-issues):

- The US and China agreed that government procurement decisions will not be made based on where the goods' or services' IP is developed or maintained, that there will be no discrimination against innovative products made by foreign suppliers operating in China, and that China will delink its innovation policies from its government procurement preferences.
- China agreed to eliminate discriminatory indigenous innovation criteria used to select industrial equipment

for an important government catalogue prepared by MIIT, to ensure that it will not be used for import substitution, the provision of export subsidies, or to discriminate against American equipment manufacturers in Chinese government programs targeting these products.

MNC R&D STRATEGIES IN CHINA

As Table 2 shows, MNC strategies have focused primarily on using low-cost talent to exploit their technology assets by localizing existing products to the Chinese market rather than developing technologies for global markets. However, R&D activities have evolved as local scientists and engineers have gained experience and capabilities, as well as the confidence of corporate management. Although no China lab has the independent authority enjoyed by more established labs in Europe, Japan, or Israel, some have begun to move in that direction.

MNC 1: Computers, software, and services

The China R&D group in MNC 1 focuses on localization of products for China and on testing for the whole

corporation. It thus works on a broad scope of technologies, but MNC 1 still limits its role to a small part of the R&D process. This R&D group does not act autonomously, but is under the control of corporate R&D management. According to one MNC 1 interviewee,

China R&D does product R&D for our whole corporate business model. China does the test phase and some localization; architectural design and business development and delivery models are all done by units outside China. We invest a lot rotating people in China through the various labs. In the future, some development and business direction may shift to China, but decisions about product offerings and positioning of the product will be decided outside China.

MNC 2: Computers

In MNC 2, the China lab serves the company's business units and participates in development for those units rather than in research. However, there is some room for local initiative, with the possibility of developing technologies for use in the parent company.

IP developed in partnership with local universities is jointly owned; the company files patents in China as well as the US.

"[MNC 2] is close to [our] business units. We develop demos that the business units request. We also develop demos based on our own imagination and show them to the business units."

IP developed in partnership with local universities is jointly owned; the company files patents in China as well as the US. As one interviewee said, "Patenting is not different in China from elsewhere. [We] have experienced, professional people in the company to help with patenting."

MNC 3: Software

MNC 3 operates as an independent R&D unit serving the firm's global businesses. All of the company's business units are present in the China lab and operate independently of each other, working on their own projects. The lab director referred to this as a federated model. This company has a heavy focus on basic research and operates its China lab accordingly, "hiring top researchers and leaving them alone," according to the director.

MNC 3 also does a substantial amount of software localization and outsources to local firms as part of an agreement with the government. The goal is to help China

develop a domestic outsourcing industry that is competitive with India.

MNC 4: Semiconductors

MNC 4 has been aggressive in trying to transition from little more than a satellite operation created for public relations to an independent lab on par with other leading labs outside the US.

The director of research at MNC 4 stated that the company's R&D had gone through four phases since it first established a lab in China 10 years ago. At first, MNC 4 was just trying to "give back to China," as it had been making a lot of money there.

In the initial phase, Chinese engineers were well behind the skills of their counterparts in other countries. They thus worked on software that was for internal use only, not for the company's products. In the second phase, teams in the US sent tasks to the China lab for the development of designs initiated in the US. In the third phase, some senior engineers in China could initiate a project, but the team in China could not carry out the entire project. The current fourth phase is a shift to developing an independent R&D lab capable of carrying out complete projects to develop technologies for use in China and other markets.

MNC 5: Mobile communications

MNC 5 has a history of extensive R&D activity in China, a major market and operational center for the company. Its R&D labs are part of a global network, and the company expects that China will move from a following to a leading role over time. According to the R&D director,

Our different R&D centers around the world coordinate and compete with one another. The R&D centers try to get involved in projects rather than just wait to be chosen. Each business unit looks at R&D globally and decides where it wants to do things. If the cost of other locations is too high, they're likely to grow more in China. Our R&D center's mission is to transition R&D from localization and support to development projects and then to projects for some global markets.

EXPECTATIONS AND IMPLICATIONS

The MNCs in this study conduct R&D in China primarily because China's government at least implicitly expects such investment in exchange for market access and favorable treatment. Some seek to exploit China's large pool of low-cost talent; others see market opportunities for their products and services as well as learning opportunities that they can apply to other large emerging markets. They also seek to meet the special requirements of local customers.

These R&D centers seldom operate independently of an MNC's business units or its other R&D units. Most perform a well-proscribed development function within this larger

framework, usually more development and testing than actual research. R&D management outside China, usually in the US, determines their activities. However, a trend toward greater autonomy is arising at some companies.

Implications for MNCs

China is serious about becoming a center for indigenous innovation, so MNCs must carefully consider whether and how to develop R&D there.

It is true that China generally favors domestic firms in many policy decisions. Although it is convenient to see a dynamic that pits the Chinese government against the MNCs as a group, the reality is much more complex. Various central ministries as well as provincial and local governments set and implement Chinese policies, and they do not always coordinate efforts.

MNCs can sometimes thread a path through the system and benefit from favorable treatment, especially from provincial and local governments, which are more interested in receiving investment than in enforcing indigenous innovation policies. On the other hand, it is difficult for MNCs to know where they stand; one institution might overturn another's approval.

Lessons learned

Several lessons come from the experience of the MNCs in this study. Some apply to all firms, whereas others depend on a specific firm's circumstances in China.

Although government agencies and state-owned enterprises are a difficult market to break into, MNCs continue to anticipate that their share of domestic business will increase as China grows. They sometimes compare China to Japan and Korea, where protectionist economies have gradually opened up, and MNCs have grown their businesses with domestic companies. This confidence appears to be justified by the performance of firms with greater experience in China. In a recent survey, only 42 percent of US companies with less than two years in China reported China operations were profitable or very profitable. In contrast, that figure was 81 percent for firms with 10 to 20 years in China, and 76 percent for firms with more than 20 years' experience.¹⁶

But China is also different in many ways. Japan and Korea encourage competition among private domestic companies as well as with foreign MNCs, whereas China promotes national champions in many sectors. In the long run, domestic companies are likely to become competitive in more industries both at home and globally.

A key issue for foreign MNCs is to balance a realistic view of market potential against the risks of exposing IP through R&D in China's complex and uncertain environment. An interesting case is Apple, which has no R&D in China, yet has seen its sales there quadruple in one year. China ranks as Apple's second largest market, accounting for 16 percent of

global sales in 2011 (www.bloomberg.com/news/2011-10-19/china-becomes-apple-s-second-largest-market-by-sales-cook-says.html#). Whether Apple can sustain its growth without committing to R&D in China remains to be seen.

One lesson from the history of MNCs in China is that an MNC should not individually challenge policies that it finds unacceptable. China does not need any individual MNC, but it does need MNCs as a group to help achieve its technology goals. So the government sometimes reconsiders when facing complaints from several MNCs, especially when these firms can rally local allies, as in the Green Dam case. MNCs can also solicit pressure from the US or other governments, especially when a policy is inconsistent with international rules.

Google's experience highlights the risks of a direct challenge to the government by a single company. China's rich complexity requires that MNCs develop a highly nuanced strategic approach. MNCs must balance helping to advance China's goals in return for market access without giving up their own sources of competitive advantage.

Because of strong motivations to invest in R&D regardless of policies, it appears that in many cases, China's indigenous innovation policies do not matter. Companies with experience in China continue to prosper. As Apple's experience demonstrates, even new entrants that have products Chinese consumers want can do very well. Indigenous innovation policies might even benefit MNCs that have a strong commitment to China, but those companies must be very careful about exposing IP to take advantage of government incentives. **□**

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