

BY MARSHA VANDE BERG

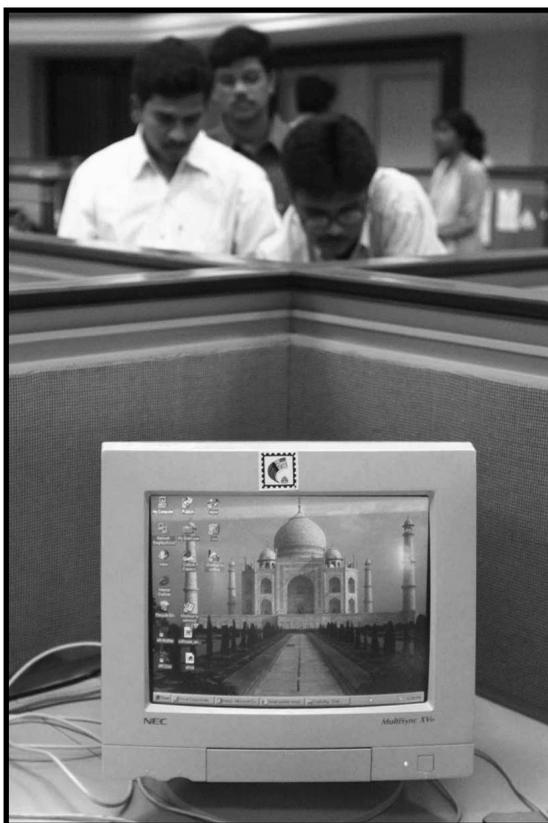
India and China, with their fierce nationalism, technological ambitions and combined population of more than two billion, cast giant (if ill-defined) shadows over the global economy. And nowhere is the relationship between India and China as uneasy neighbors and natural competitors more evident than in the software industry.

India holds the lead, facilitated by an early start, an education system that understands how private enterprise works and a timely boost into the international big leagues as the leading provider of Y2K-bug fixes. New Delhi is forecasting that the output of the country's information technology sector will reach \$140 billion by 2008 – on the order of one-third of today's entire GDP. This year, software exports are expected to be \$6 billion, a 47 percent increase over last year and about six times China's exports of software.

China, bold, aggressive and hungry for recognition of its past and future greatness, is unwinding bits and pieces of its software sector from government controls. In the short term, reformers anticipate the moves will enable China to take advantage of an industrywide shift toward cheaper sources of supply in technology services. In the long term, they hope a thriving information technology sector can serve as a buffer to the economic dislocation that is inevitable in the wake of entry to the World Trade Organization.

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One ironic consequence is that China, which has outpaced India in economic growth for half a century, has begun looking to India as a role model. This makes Indians nervous. Some worry that China will become a cheap-

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er alternative for the West in the accelerating race for software outsourcing. Others acknowledge the developing competition, but hope to use it to press New Delhi for deregulation that allow information technology to grow even more rapidly.

In May, B.V. Naidu, head of the Software Technology Parks of India, joined the chorus of those who see China's information techno-

competitive," he says, "but right now, the needs are so huge globally, there is enough work to go around." The larger problem is one of available talent – in Asia and the West.

Kanwal Rekhi, president of Indus Entrepreneurs, an advocacy group for Indian entrepreneurs in Silicon Valley and in India, is likewise sanguine about the budding competition. Still, he says, "India should always be nervous about the Chinese." Rekhi is old

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logy threat in nationalist terms. After returning from a major technology fair in Beijing, he told *The Times of India* that China's goal is "to overtake India. They made it very clear in the exhibition (with a) signboard that read: 'Our aim is to become the future Bangalore of China.'"

Not everyone sees China's success in zero-sum terms. "China is not competitive yet," explains technology analyst George Koo of Deloitte & Touche in San Jose. "India is entrenched – and the Chinese are just beginning. Rarely does this kind of circumstance produce companies in the same space bidding on the same contract."

But give the Chinese information technology sector five years – or less – to catch up, and the ballgame has a chance at evening up. "Things in high tech move very quickly," Koo reminds.

John Chen, president and CEO of Sybase, a software manufacturer in Emeryville, Calif., that does business in both India and China, takes a long view, too. "The Chinese could be

enough to remember that Chinese soldiers marching into India during the 1962 Sino-Indian border war – a conflict that remains unresolved to this day.

It is unlikely the Chinese could succeed in surpassing India's breadth and depth in software anytime soon, Rekhi argues. Many Indians speak English, he notes, and they grow up in a culture that nourishes individual initiative: "I don't see any danger of losing our position."

The voluble Rekhi is, by the way, one of Silicon Valley's best-heeled philanthropists. He sold his company in 1989 to Novell for \$210 million and now supports Indian entrepreneurship through TiE, educational programs and a lot of venture capital seed money.

The China-India competition in software has implications for United States policy. Washington supports a policy of political and economic engagement with both countries. At the same time, the Bush administration has shown signs it sees India as a counterweight to Chinese power in Asia. The long-



standing concern for United States policy-makers is that China's economic rise fuels a growing military might and a widening of ambitions regionally.

Typically, software represents only 15 percent of the information technology pie in market value – content is about 80 percent and hardware the remainder. But software remains the darling of advanced industrial economies because of its central importance in promoting knowledge-based industries and, more generally, competitive technological change.

According to Chen, hardware has a different “personality.” Hardware contributes to GDP, but the sort of business infrastructure that goes with software production is more

likely to spur innovation and growth. “The Chinese government is encouraging its software sector because it sees a chance to leapfrog” out of its current status. They have the people. They just have to train them, says Chen.

Beijing acknowledges its short supply of expertise when it comes to developing software and related services. According to IDC, the research group, the computer education and training market in China is expected to grow by 40 percent annually. But that's from a trivial base: it was just \$116 million in 1999. To accelerate the process, the government is promoting two-year certificate programs as an alternative to the traditional route of getting a university degree. Two-year programs

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offer practical education and the chance to learn specific skills. This represents a change in attitude by both the government and students, says Chen.

Beijing is also allowing foreign firms to invest in its training programs. The benefit for companies like Sybase is access to a pool of graduates who are prospective employees. Other American companies with links to Chinese training centers include Oracle, Microsoft, IBM, Intel and Cisco Systems.

India's big information technology training firm, NIIT, is also a part of this picture.

core of India's strength in software. The six branches of the Indian Institutes of Technology (IIT) stand out in an otherwise perennially underfunded education system. Indeed, many of the success stories in Silicon Valley and elsewhere in the world are products of IIT.

The Indian information technology stars on the Bombay and New York stock exchanges are Infosys, Satyam and Wipro, all of which specialize in outsourcing services for Western multinationals. Infosys and Wipro rank with 10 other Indian-based companies among the top 21 software companies world-

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NIIT opened its first Chinese computer education program center in 1998 in Shanghai, then teamed up with Robert Kuok and his TVE International to branch out on the mainland.

Institutions don't drive this process, the practitioners do, insists Rekhi. "The people who are in place" must be given a wide berth to build on their collective experience, drive the process of innovation and grow the field, he says. "That's why a great leap forward is not possible." Working in software is like groping in the dark until, suddenly, an idea stands out. "You don't get to that point because 1,000 flowers are allowed to bloom." At the core must be a conscious decision to let brainpower, not government, lead development, he adds.

Training and education, plus a proclivity for English as a second language, are at the

wide, according to the Carnegie Mellon Software Engineering Institute.

Collectively, Indian firms can now claim one-fifth of the world market in customized software. They are deeply engaged in the United States as well as in the Mideast, where oil revenues are getting invested in technology upgrades. They've also targeted Southeast Asia – Singapore, in particular – as a partner in infrastructure projects furthering information technology development. They began their climb up the software value chain unhampered for the most part by India's implacable bureaucracy and proclivities toward a "license raj" – a taste for central planning so all-encompassing that, by comparison, Leonid Brezhnev was a cowboy capitalist.

Things were not always this way. It took a team, including Rekhi, to lobby the government hard for relief from the grip of the

byzantine regulatory structure. The governing coalition, in place since 1998, responded by taking its hands off the sector.

The government set in motion deregulation of the telecom industry and then loosened its hold on the construction of the Internet backbone. This allowed Bharti Telecom to team up with Singapore Telecom to lay nearly 22,000 miles of optical fiber to link up India's smaller networks. The duo also is laying a sophisticated submarine cable spanning the Indian Ocean. It is expected to reach the city of Chennai in southeast India sometime next year and then extend to a total of 10 cities by year's end.

T.G. Ramesh, the co-founder of Bangalore Lab, explained to one Indian newspaper: "give Bangalore bandwidth, and you have a services revolution." He might have said the whole of India.

In China, the infrastructure buildout is proceeding along a path similar to that pursued in 1991 in India, when the central government authorized construction of more than a dozen software technology parks. Beijing's daisy chain of tech parks is being constructed in urban areas designated for technology development. The effort plays to China's stronger hardware suit, as well as to China's intention to develop its software sector. Two of the best-known parks are the Zhongguancun Science and Technology Center in Beijing and the Shanghai Pudong Software Park in Shanghai. According to Dong

Tao, a senior regional economist with Credit Suisse First Boston in Hong Kong, "In 10 years, China will be the world's largest producer of information technology hardware."

Along the 45-mile corridor between Shanghai and Suzhou that is famous for its dynastic-era gardens, Logitech International, a Swiss company, assembles more than one-third of



the mice used in personal computers worldwide. Soon, nearly every type of computer component will be made in this region around the Yangtze delta, fueled in large part by Taiwanese investors looking to contain rising labor costs and to capture a share of the growing domestic Chinese market.

In the last two years, some \$10 billion has poured into the mainland from Taiwan, a modest acceleration of the rate of the past decade. Last year, according to *The New York Times*, cross-strait trade reached \$30 billion, making Taiwan the sixth-largest trading partner of China. "That's the direction things are going," says Koo. "It's as natural as water flowing downhill. Business goes to where the costs

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are the lowest.”

Still, at least two major drawbacks stand in Beijing’s way. One is a dubious claim to the second-highest rate of software piracy on the planet – a problem that reflects the government’s casual attitude toward intellectual property rights. (Vietnam gets first prize.) According to the Business Software Alliance, a trade group representing software enterprises worldwide, the industry absorbed \$11.8 billion in losses due to piracy last year. Of that total, \$1.12 billion was lost in China.

Another drawback is the scarcity of private capital to underwrite what Silicon Valley’s Rekhi calls the ideas that get discovered while groping in the dark. Last June, there was at least one sign that reformers intended to get serious about this issue. Wang Wenjing, a 36-year-old programmer, got permission to raise capital for his software company, UFSOFT, by selling shares on the Shanghai Stock Exchange. It is an encouraging sign, Wang told *The New York Times*. “Private companies are growing, and the environment for raising capital is getting better and better.”

The achievements of both the Indian and the Chinese economies have been considerable since Deng Xiaoping abandoned socialist orthodoxy in the late 1970s and reforms began in India in 1991. Today, both economies are realizing larger growth rates than the West, and both have put some distance from the wretched economic circumstances of the post-World War II era.

Both now attract sizable chunks of foreign investment, although China continues to receive the lion’s share and is likely to do even better as accession to the WTO comes closer. Likewise, both are major beneficiaries of technology transfers from the West. The result is that the software sectors in both have been able to move out front in efforts to be com-

petitive at home and abroad.

E-commerce is also growing, along with use of the Internet, but from pitifully small bases: the China Data Network Service, the leading domain service provider, reports some 20 million individual registered Internet users, just 1.3 percent of China’s population. In India, the Indian Market Research Bureau estimates that 1.1 million people have Internet subscriptions – about 0.1 percent. A tiny fraction of this tiny fraction have high-speed connections.

Usage is concentrated in the better-off urban areas in both countries. And while Internet penetration is growing faster in the world’s largest democracy, many Indians still feel their hands tied by a large bureaucracy with a deep affection for the status quo.

In China, party boss Jiang Zemin assumed Deng’s reform agenda when he took over after the crackdown on Tiananmen Square in June 1989. Together with Prime Minister Zhu Ronghii, he has helped redefine the economy’s central tenet of state ownership. Still, the leadership in the Chinese Kremlin remains unwilling or unable to overcome ideological inertia standing in the way of all-out economic reform.

But change also happens incrementally. Dewant Mehta, the popular and passionate advocate for India’s high-tech sector who was the head of the National Association of Software and Services Companies until his death last spring, characterized the relationship between the two Asian nations and their aspirations for greatness in technology this way: “There’s competition and there’s also cooperation. ... With the Chinese, we’re looking at both. We’re happy about China doing well. It challenges us to keep ahead. It also helps me lobby the Indian government. I say, ‘China is doing this; we have to do that.’ And things get done.” **M**