Twenty-Two

Knowledge Is Wealth

The raft of knowledge ferries the worst sinner to safety.

—BHAGAVAD GITA

The Vedic adage "Knowledge is wealth" sums up the Indian opportunity in the new century. For the world has changed from an industrial to a knowledge economy. We have witnessed epochal and transforming innovations in electronics and information technology. For the first time in history we are able to see a technological revolution that offers the opportunity for bridging the gap between the haves and the have-nots. As the technology converges between television, computer, and telephone, the Internet could touch everyone's life and break the barriers that have divided us up to now. Although it is not a panacea for all our developmental problems, used imaginatively, it can be a powerful vehicle to transform the lives of ordinary people, both socially and economically.

The transformation of the world from an industrial to a knowledge economy means that jobs, exports, and economic activity with the highest value added will come from the knowledge sectors of the economy, and countries that participate vigorously in these sectors will be rewarded with a growing and higher standard of living. The history of how country after country went from poverty to prosperity over the past two hundred years teaches us that the transformation was generally powered by one sector, which became the engine of its economic growth. In Britain, it was textiles; in the United States, the industrial revolution was led by the railways. Timber and timber products were responsible for Sweden's takeoff; milk and dairy products did the same for Denmark. In business terms, the nation's leading sector reflects its competitive advantage. Over the last fifty years India has struggled to find its leading sector, and this explains, in part, its inability to create an industrial revolution. Now, it may have found it in the knowledge sectors of the economy.

India's emerging success in information technology is the first evidence of competitive advantage. Its electronics industry has been the fastest-growing sector of the economy between 1994 and 1999, rising 25 percent a year, with turnover of $8.5 billion in 1999. Software exports have been growing 60 percent a year over the past five years; they crossed $5 billion in 2000 and are expected to rise to $50 billion by 2008. On 1 August 2000, the market capitalization of listed IT companies was more than $78 billion. Out of 19 top global software companies that had achieved the highest certification for quality, as many as 12 were Indian. More than 400 portals were being launched every month during the first two quarters of 2000, backed by 28 venture capital funds with close to $1.5 billion investment, which is expected to rise to $7 billion by 2005. Supporting this effort is over 123,000 kilometers of fiber-optic network over 24 million lines. Even the government has established an Internet site—http://itformasses.nic.in—on which it invites suggestions from citizens on how to bring information technology to the masses as part of a national campaign called "Operation Knowledge."

Yet this is only a beginning, for India still has a vast distance to travel before it can call itself an IT power. Its $5 billion software exports are a fraction of global exports of more than $200 billion. It has only three computers per thousand persons (which is expected to rise to twenty per thousand by 2008). And even for people with computers, getting connected is slow. The root of the problem is the government telecom monopoly, which insists on protecting its turf rather than allow private competition. Prime Minister Vajpayee has opened the Internet to private providers and recently broke the government monopoly on long-distance telephone calls, and this should ease the situation. The National Association of Software and Service Companies has launched a campaign to boost Internet bandwidth eightyfold by 2003 with the backing of at least three large companies—Enron, Hughes Telecom, and Reliance, each of whom plans to invest $500 million to $1 billion.

Although information technology is becoming a mantra inside the government, many Indians remain skeptical of bureaucratic intentions. When the government started a new Ministry of Information Technology in 1999, entrepreneurs and the media were not amused. They believed that the IT industry had grown because of official neglect. When the new ministry announced a new $20 million venture capital fund, the media dubbed it the "Nephews and Nieces Fund," and people expect that it will be used to fund companies owned by the relatives of politicians and bureaucrats. The government should realize that even in Israel, a tech-savvy country with better governance, government funding of technology has failed. The head of its $100 million program admits that "not even one profitable project has come out of the incubators." Bureaucracies move slowly and technologies move rapidly, and this reassures entrepreneurs. The Indian bureaucracy is still trying to tax and regulate the physical movement of goods in the old economy of the pre-1991 era, and fortunately has failed to fasten its claws onto knowledge-based products and services.

The short-term answer to wiring India lies in cable television. Right now, in mid-2000, around 3.5 million Indians have Internet access through personal connections, Internet kiosks, and cybercafes. However, investment bankers like Goldman Sachs and Crédit Lyonnais Securities project that the number of Internet users could rise to 30 million by 2004. And cable television will pave the way. Of the 68 million TV homes in India, more than 32 million have cable connections and they are growing 8 percent a year. This is more than the number of telephones in India—22 million—and more than all cable homes in South America. Cable TV is cheap (Rs 150 per month for up to seventy channels) and it is largely unregulated. "The land of the license raj somehow forgot to regulate cable," says the *Economist.* An enterprising person can run wires along trees to a few hundred homes, beam programs from a room, collect money, and he or she is in business. The result has been a boom: 60,000 to 70,000 cable operators have come up, according to the Cable Operators Federation. It is a cut-throat business with low margins, but it is fast consolidating. Hindujas' INCableNet is investing up to $500 million in upgrading its cable networks. It has already laid 150 kilometers of fiber-optic cable in Bombay and is now offering speedy Internet access to some of its 1.9 million customers in the city. Intel, the world's largest chip maker, is so impressed that it has valued INCableNet at $1.5 billion and invested $49 million in it. Its big rival, Siticable, run by Zee Television, claims to be worth $3.5 billion, and has even more ambitious plans to offer Internet access over cable lines by the end of 2000.

Not since the heady days of the green revolution more than thirty years ago have we felt the same excitement and fever. This time around, it is the educated young in our largest cities who are leading the charge. I visit and speak often at college campuses, and there I have found new energy and fire, once again coming from the thrill of a new technology. In the early 1990s, it was software. This time it is the Internet and IT services. Although the subject of my lectures varies, the students want to talk only about how to become Internet entrepreneurs. They have amazing ideas, which they call their "inner dreams." I encourage them to pin their dreams to a business model and seek venture funding. "The moment is yours," I tell them. "Seize it."

Some brave ones have taken the plunge, and are beginning to burn the midnight oil. And venture companies are falling over each other to grab the best early players. Established companies are setting aside funds to incubate hundreds of entrepreneurial ventures. One has only to read the *Economic Times* and *Business World* to follow this revolution from week to week. *Business World* reported in February 2000 that a dozen venture capital companies are evaluating five hundred business plans a month. Hundreds of young managers in the industrial companies and banks have also been bitten by the Internet bug and are beginning to leave their secure jobs and become partners in the new start-ups. Indian subsidiaries of multinationals like Lever, Citibank, GE, and Motorola lost dozens of managers in the first two quarters of 2000.

There are three kinds of companies, according to Professor David Birch, formerly of MIT. He calls them elephants, mice, and gazelles. The elephants, of course, are the large Fortune 500 companies like General Motors. The vast number of tiny enterprises in the bazaar—retail shops, restaurants, and services—are mice. The third are gazelles, which start small and grow extremely rapidly through innovation. Microsoft, Intel, Oracle, Netscape, and America Online started as gazelles. Sometimes gazelles create entirely new industries, as did FedEx and UPS.

Professor Birch says that a vast majority of the new jobs in the United States have been created by gazelles. It is well known that the United States has been extremely successful at generating employment, having created tens of millions of new jobs in the last two decades. The elephants have not added much to employment; in fact, they have down-sized. Neither have the mice: for every new one that comes up, another usually closes. The gazelles eventually become elephants, but on the way (as they ride the "S-curve") they create an enormous number of productive, high-quality jobs. Successful economies create conditions for the gazelles to come up and to succeed.

In India, we too have had gazelles—Reliance, NIIT, Jet Airways, Infosys, Zee TV, to name a few. Our challenge as a nation is to find entrepreneurs who have a vision and a dream, and who will be the gazelles of tomorrow. This is not easy, for the scarcest resource in any society is entrepreneurship, and four out of five entrepreneurs fail. So it is a real art to find out who will succeed. The question is, how do we identify and nurture gazelles? And who should do it? Clearly the government should not—it does not understand business and will only succeed in killing them.

The answer is venture capitalism. Many of America's gazelles came up this way. A venture capitalist doesn't go into business himself but looks for a young person with an idea and offers him or her capital (and management help) in exchange for a share of future profits. Since banks are risk averse and will not lend to a young person with an idea, every entrepreneur is always short of capital

and welcomes a backer. When the business has built a record of profits, the sensible thing is to take the company public and raise the capital for expansion through the stock market. This is also the opportunity for the venture capitalist to book his profit, sell his shares, and exit from the venture. And look for another gazelle to nourish.

A number of successful Indian industrialists have asked me over the years for advice on philanthropy. Typically they say, "I have made my money and I am not getting any younger. What should I do? Where should I donate my money?" When Indian businessmen think of philanthropy, they usually think of temples, hospitals, and schools. These are good things, but I generally turn them in the direction of a good nongovernmental organization (NGO), because I find they are doing a better job of social uplift than private charities. However, after reading Professor Birch, I think that spotting and nourishing gazelles can also be a kind of philanthropy. What could be better than to provide seed capital to a young person with a dream and thereby create thousands of productive new jobs in the economy and build national competitiveness at the same time?

This is not an entirely new idea in India. Some business communities—notably the Jains in Gujarat—provide risk capital to young entrepreneurs with the understanding that they will repay it later in life. In the nineteenth century, there existed a similar support system for Marwari youngsters who went off to Calcutta from the villages of Rajasthan. My son argues that venture capitalism is not philanthropy, it is business. But if one retains the capital and reinvests the profits in new ventures, then I think it is philanthropic. To further my own venture capital ambitions, I met a number of experts and discovered that venture capital funds had not done well in India. To do the job properly, I realized, it should be a biggish fund, and it should be run by professionals.

As luck would have it, one spring morning in 1999, quite out of the blue, two young Harvard Business School graduates, Ashish Dhawan of Goldman Sachs and Raj Kondur of Morgan Stanley, phoned me from New York. They were thinking, they said, of quitting their jobs and starting a venture capital fund in India. They thought they could raise $50 million from Wall Street, and would I be the chairman and adviser of their Chrysalis Capital Fund? It was like a dream come true, and I jumped at the idea. They flew to Delhi and we finalized our agreement. I also agreed to invest a modest sum in the fund. The following month I went to New York, where I met one of their lead investors, Jeffrey Kiel, the former president of Republic National Bank, who, like me, had quit at age fifty; he had joined Edward Stern, senior partner at Lazard, to start a private equity company called International Real Returns LLC. I asked him why he was planning to invest a large sum in Indian ventures. He said he had done well by investing in Israeli high-tech ventures, and India offered the same opportunity, only in a bigger way. By now my young associates had also quit their jobs. They told me that they had created a data bank of one hundred Indians in America who were reportedly worth over $50 million each, many of them in Silicon Valley. We agreed that they would be promising candidates for funding our venture capital project. As it turned out, we were able to raise over $100 million and we had to cap the fund at $65 million. We were able to raise part of the capital from a dozen Indian CEOs in Silicon Valley.

By July 2000, seven months later, Chrysalis had invested in thirteen information technology companies and was recognized in India as a leading venture capital fund. Its team had grown from

three to twenty-three; it was in the process of closing two more deals in July, and with that it would have committed the entire fund. Based on its early success, it was planning a second, larger fund. We defined our mission early and with vast ambition: "To build a new India by inspiring and nurturing passionate entrepreneurs." With that motto as a guide, Dhawan and Kondur moved at a feverish pace to seek out IT service providers and fill the Indian Internet spaces based on models that had worked in the United States. Hence, Chrysalis quickly invested in firms that designed Web sites, or provided software solutions or remote services. It also bought into an auction site called Baazee.com, started by two young Harvard Business School graduates, who hoped to make it the eBay of India. It funded Fabmart.com, the leading e-tailing site, which aims to become the Amazon.com of India and which has expanded from selling books and music to offering jewelry and groceries online. It invested in JobsAhead.com, the leading jobs site in India, which wants to duplicate the success of America's Monster.com. Started in March 2000, by 1 June it had acquired 700 corporate customers, 8,000 job listings, 90,000 resumes, and 150,000 registered users with 70 employees. Our most interesting investment is egurucool.com, a distance-learning portal for students preparing for high school finals and college entrance examinations. It has a homework helpline in the evening where teachers help students with their homework. Aside from such business-to-consumer sites, Chrysalis has also invested in Spectramind, started by the former head of GE Capital's outsourcing center, and it aims to become India's leading call center and remote services provider. Similarly, we have invested in TransWorks, a Web-based customer service center providing e-mail management support for customers like Citibank. Other investments include ITNation, a vertical business-to-business portal for IT products and services, Avigna Technologies, a Web-design firm based in Madras, and Ivega, a software development and consulting company in Bangalore that targets financial services.

It is too early to say how many of these companies will succeed, but Chrysalis's ability to source good deals is the result of its coming at the right time to India and moving rapidly to close the deals. It devotes a great deal of time to holding the hands of entrepreneurs—helping them to find technology partners and locate high-quality employees, introducing them to customers in the United States and Europe. I personally have been devoting three to five days a month to helping some of our portfolio companies build their brand name and develop their strategy and marketing plan. I am on the boards of four of our portfolio companies and it is one of the most interesting things that I have done in my life.

Dhawan and Kondur are beginning to inspire other Indian youngsters in America. One of them is my nephew, Yuvraj Singh, who is twenty-nine years old and worked as a bond trader with Lehman Brothers on Wall Street after he graduated from Princeton. He quit his job in July 2000 to become a venture capitalist and plans to fund software entrepreneurs in financial services. By mid-2000 more than two dozen venture funds were operating in India. Though it is difficult to say how many Internet companies have started in India—estimates range from 220 to 500—60,000 domain names were registered out of India, and between the airport and South Bombay 160 billboards, 85 percent of the total, belonged to dot-com start-ups in the summer of 2000.

Technology stocks in India, as in the United States, had defied gravity in 1998 and 1999, scaling one peak after another. Then, on 14 April 2000, came the Nasdaq crash, which brought carnage in

new economy stocks in India as well. India's dot-com fever had begun in 1999, four years behind the U.S. cycle; nevertheless, the tremors of the U.S. crash affected venture capital sentiment in India. Fund flow has not declined—on the contrary, it is projected to double in 2001—but investors are more cautious and now focus on business-to-business sites, software services, and technology applications. Business-to-consumer sites have fallen out of favor—especially e-commerce models, which have also failed in the United States. At Chrysalis we believe that services which people pay for in the real world will migrate to the Web. This is why we consider some of our better bets to be distance learning (because students pay college and prep fees) and job sites (because companies pay a headhunter's commission). Edelweiss Capital, a venture firm, looks for businesses which use the Internet as an enabler. Gary Wendt, another venture capitalist, believes that the Internet will not change business itself, but the way it is done—by reaching customers faster and reducing costs in the supply chain; thus, he would prefer to invest in a brick-and-mortar company which moves to the Web.

The dot-coms are also changing. They are attempting to marry the online with the offline world in what is now called the "click and brick" strategy. India Infoline has acquired a thirty-two-branch company in the south that distributes financial products; Net2Travel has bought two travel agencies to improve delivery; the entertainment site Hungama has cultivated a network of 560 cybercafes for promotions in order to drive traffic to its site; Jobsahead.com holds fairs in large cities where recruits meet potential employers; shaadis.com, an Indian weddings site, not only helps find grooms and brides on the Net but has tied up with an event management company that specializes in arranging theme weddings—Rajasthani-style weddings and rural temple marriages are especially popular.

Despite the cool stock market, the gold rush is real. There is a frenzy with which new ventures are starting. Mantra Online's CEO, N. Arjun, believes that there will be one thousand portals by mid-2001. Even though 80 percent of the people connected to Internet in India use it mainly for e-mail, everyone is looking two to three years in the future when thirty million Indians will be connected. These ventures will soon face tough competition from established companies and from Internet companies in America. This is happening in Japan, where Sony and Fujitsu are linking with American dot-coms; NEC has recently acquired a 30 percent stake in eBay, and Yahoo Japan's share price was quoting at two thousand times projected earnings for fiscal 1999. Indians know that foreign portals are coming, but they point out that in China the top three portals are Chinese. They believe their advantage over foreigners will be creative local content that ultimately brings traffic to a site. But I believe success will depend on execution. Ideas can be copied, but it is the ability to execute ideas which will define the winners.

The inspiration for our new economy is the 250,000 Indian warriors now living in Silicon Valley. *Business Week* reported on 6 December 1999 that an extraordinarily large number of new enterprises in Silicon Valley—more than 30 percent according to the article—were started by Asians, with the overwhelming number being Indian. Many Indians have also had a huge success on the Nasdaq; K. B. Chandershekhar's $200 million Exodus Communications carries 30 percent of all Internet content, hosting popular Web sites like Yahoo, Hotmail, and Amazon; Suhas Patil's $628 million Cirrus Logic makes chips; Ajay Shah's $750 million Smart Modular Technologies makes memory chips and modules in four countries; Prakash Aggarwal's $240 million Neomagic integrates memory and logic

in a single chip—this makes the chips more powerful and gives him a 50 percent share of the laptop graphics market; Vinod Gupta's 120 million Integrated Systems makes software for home appliances, while his wife Vinita's $66 million Digital Link makes network equipment.

The legendary heroes and mentors to the young are the visionary masters of the World Wide Web, "serial entrepreneurs" and venture capitalists. Vinod Dham, father of the Pentium chip, now wants to revolutionize telecommunications. Founder of Silicon Spice, he will, he says, "do for telecom what Intel did for PCs." He envisions a world where telecom, like water, is available on tap. There is thirty-year-old Sabeer Bhatia, who created Hotmail and sold it to Microsoft for $400 million in 1998. He has started a new company that will "do to e-commerce what Hotmail did to e-mail." The portly Kanwal Rekhi, who founded one of the first Indian companies in the valley, Excelan, and sold it to Novell for $250 million, is now a venture capitalist and claims to have made $100 million from investing mainly in Indian ventures. Vinod Khosla originally founded Sun Microsystems, and he has a net worth over $100 billion, placing him forty-four on *Forbes'* list of the wealthiest Americans in 1999. Among the richest Indians in the United States, however, is Ravi Deshpande, who sold his company Cascade Communications to Ascend for $3.7 billion and promptly started a new multibillion venture called Sycamore Networks to make network routers. Other "serial entrepreneurs" include Prabhu Goel, who has started three high-tech companies and is an investor in five others, and Purna Pareek, who sold his Java-based server, Apptivity, for $30 million in 1998. A hardware success is Hemant Kanakia, who sold his Torrent Network Technologies to telecom giant Ericsson for $450 million. Prakesh Bhalerao, a Ph.D. from MIT, has investments in thirty companies and is CEO of four others, all of which he has housed in a single rented 15,000-square-foot space. Finally, Bipin Shah, CEO of Invox Technologies, is selling an innovative new chip to Motorola, Hyundai, and others that could transform digital voice recording; he is also an angel investor in five other companies.

Almost all of these Silicon Valley entrepreneurs have followed the same script. They came to the United States in the seventies and eighties as young engineering graduates—usually with a degree from one of the prestigious Indian institutes of technology. They got a Ph.D. from an American university and worked in a high-tech company for a few years before setting out on their own. Although "their brains are in Silicon Valley, their hearts are in India," says *Business World,* and they are now beginning to finance Indian students at U.S. universities and fund new start-ups in India and by Indians in the United States. They formally came together in 1992 to form a network called The Indus Entrepreneurs (TiE), which has one thousand members today, divided into four chapters for the purpose of fostering entrepreneurship. The members meet regularly and examine business plans proposed by young Indians. TiE has pledged $7 million to the Center for Civil Society in India. Individually members have contributed to their alma maters, mainly Indian institutes of technology. Venkatesh Shukla, CEO of WebByPhone, runs the "Foundation for Excellence" and has funded nine hundred students in the past three years. Prabhu Goel and Kanwal Rekhi have committed to finance fifteen thousand students. Prabhu Goel had his chips designed at Noida, near Delhi. Vinod Dham sources his software from Bangalore for Silicon Chips; Murali Chirali does the same from Bangalore. K. B. Chandershekhar has funded two high-profile start-ups in Bangalore—Aztec

Software and Gray Cell—and wants to "create six world-class entrepreneurs out of India." Dilip Sontakey of EZ Data in California is establishing a $5 million IT township near his hometown, Nagpur, in Maharashtra, to create five hundred high-tech jobs. This is how Indians abroad are beginning to give back.

Every age has its Left Bank, says the author Dennis Cass. It is "the place where hot, restless souls test their capacity for adventure, the place like Silicon Valley today, where people are more alive than you or I." It is the spirit of our age that twenty-five-year-old tech-born hipster programmers in their hundred-thousand-dollar cars and wearing khakis and polo shirts working fifteen-hour days in lusty start-ups define the romance of our Left Bank. It is not surprising that Silicon Valley, where "cool people work," should inspire Indians—after all, high-tech is the mantra of our times. But why Indians should succeed in Silicon Valley is a more difficult question.

Many Indians are skeptical about India's ability to succeed in the knowledge economy when it failed in the industrial economy. They insistently ask how will a few hundred thousand "knowledge workers" transform the lot of a billion people, particularly when 40 percent are illiterate and our infrastructure is so poor? One answer is that knowledge industries operate in the service economy and are typically employment-intensive compared to manufacturing. Indian knowledge workers also have a clear cost advantage. Companies like NIIT, Zee Television, and Bharti Telecom are creating masses of new jobs in services. Subhash Chandra, whom we met earlier, claims that Zee TV alone has directly and indirectly created 250,000 jobs by outsourcing production and content creation. Remote or IT-enabled services over the telephone or the Internet are beginning to create large numbers of new jobs in call centers. Increasingly international companies are outsourcing back-office work, answering customer queries by telephone or e-mail to India, as we saw in chapter 17. As noted, McKinsey projects that remote services could become a $50 billion business employing one to two million Indians. These alone could employ all of the two million graduates coming out of Indian colleges.

The power of remote services worries unions in the West. I read one morning in the online edition of the *Times of India* that customers of the venerable London store Harrods would now have their telephone calls answered from a small town near Delhi, and that this had set alarm bells ringing across Britain. A regional radio station in Yorkshire reported in a rather blunt manner that the local community which had earlier operated the Harrods call center was deeply concerned; trade union officials in London quickly issued a statement expressing reservations about British companies shifting their "back offices" to India. Another newspaper raised questions about whether the distinguished customers of Harrods would be able to understand the English spoken by Indian boys and girls. And how might these Indian lads know about caviar, Stilton cheese, or Churchill shoes? To their credit, Harrods jumped to the young Indians' defense, saying that Indians spoke English just as intelligibly as the citizens of Yorkshire.

The Leeds chamber of commerce said that if more British companies followed suit this might set a "strange" precedent. It quoted the example of British Airways' remote-processing center, which employs a thousand people in India (and this number is growing). Some insurance companies have also shifted their data processing to India, which is encouraging other insurance companies to do the

same. British Airways said that not only is this shift to India saving it millions of pounds, but the accuracy and timeliness of the work is of a very high order—everything is done and delivered back to them as they open for work in the morning in London.

But one trade unionist, deeply skeptical of the telecommunications revolution, asked, what happens when the link goes down? The *Times* report said that India must not be complacent, and may have to open its call centers to inspection by NGOs or visiting British ministers to prove that they were not employing eight-year-olds or providing one bed for five to sleep in during the off-duty hours. It added that a British Labour MP had recently suggested that British patients waiting for months for surgery be sent to Indian hospitals. The British Medical Council had found that suggestion "strange" and raised questions of hygiene and care. The report went on to talk about a similar backlash in Germany after the German Chancellor had publicly invited Indian information technology experts to come to Germany to help out with its technology problems. Finally, the *Times* suggested that India might have to employ a public relations company in the West to reassure local citizens and neutralize the criticism.

As I read the story, I realized that these fears were the manifestation of perhaps even deeper anxieties about globalization. The prospect of job losses in local communities is real, and statesmen in the West need to reassure their citizens that in the long run free trade is good for everyone, even though it causes pain to some in the short run. It is part of the rules of the capitalist game. The same fears were expressed in America some years ago when the North American Free Trade Association (NAFTA) agreement was being debated. Bill Clinton had to reassure American workers incessantly that although some American jobs would be exported to Mexico and Canada, more higher-paying jobs would in the end be created in America. And he was right, for all kinds of studies have since proven that everyone has gained with NAFTA—in Mexico, Canada, and the United States. The very real concern about job losses in the West in remote services supports my point that the "death of distance" and the communications revolution will create masses of job opportunities in India. India's advantage over other countries is that English is pervasive and call center operators have found that it takes only six weeks to get Indians talking with an American accent.

The Internet may not change everything we do, but it has already revolutionized business and will continue to do so. In 1999, 15 percent of stocks and 5 percent of books in America were sold on the Web and 40 percent of car buyers consulted the Net. While many services like travel are beginning to migrate to the Internet, most Web businesses have still not made any profit. E-commerce in America recorded only 1 percent of retail sales in 1999. Products still have to be produced and delivered in the brick-and-mortar economy. The mania for infotech stocks has proven to be a technology bubble—three out of four Internet stocks in America now trade below their issue prices. Many Internet businesses will not survive. Nothing unusual about that, surely. After all, businesses fail all the time. Dozens will merge into larger entities with a better chance of survival. It is obvious that the Internet will create new jobs as dot-coms become successful. But it is, in fact, already creating thousands of new jobs in Indian bazaars. It is almost as thrilling as the last time around a dozen years ago when manned public telephone centers arrived, and they created 1.5 million new jobs. Many of us remember in India the excitement when mothers could talk for the first time to their sons working

thousands of miles away. Now the same thing is beginning to happen with the Internet, as many of the call centers are turning into Internet kiosks, and cybercafes are opening up on street corners across the country. For some phone centers it is a matter of necessity—as long-distance rates have fallen so have their revenues. The way out, some of them are discovering, is to either acquire computer skills or hire someone with skills. The Telecom Industry Service Association is offering training programs to telephone center operators to handle e-mail, chat rooms, browsing, and e-commerce.

Sustained success in the knowledge economy will obviously require greater attention to education—both the expansion of primary education and improving the quality of higher education. More and better primary education will help wipe out illiteracy and ensure equity—that is, the rewards of economic growth will penetrate down and more people will share in the prosperity. But critics wonder how we will create computer literates when we still lack blackboards. The answer may lie, in part, with the success of experiments like the one in the Tamil Nadu that I alluded to in chapter 17. The Tamil Nadu government and private companies like NIIT are collaborating to bring computer education to government schools. NIIT provides computers and teachers and the school provides the real estate, the most important cost in private IT education. During the day children get practically free education, and after school hours it becomes a regular NIIT commercial center open to the town's residents. Whatever profits NIIT loses during the day are made up between 4 p.m. and 11 p.m. If there is profit to be made in teaching computers to young Indians, then we may have found a model for self-generating, broad-scale computer literacy in the country. If there is profit to be made, competing education companies like Aptech and Tulec will scramble to replicate this across the country. Two other states, Karnataka and Punjab, have already begun a bidding process to invite private computer academies to come and train schoolchildren under similar terms.

In another experiment, Sugata Mitra, NIIT's head of research, placed a computer in a Delhi slum. He fixed it into a boundary wall along with a touch pad (but without a keyboard). He also hung a hidden camera on a tree to monitor what happened. Within a week he found that illiterate slum children without any formal training had begun surfing the Net and in three months had created a thousand folders among them. The most avid users were six-to-twelve-year-olds, who had taught themselves to draw on the computer and browse the Web. Disney.com was the most popular site because of its games; they also liked Microsoft's Paint site—being poor, they had never had access to paper and paint; now they could paint without paper. And once they discovered MP3 digital music files, they began to download Hindi film music and play it all day long.

This experiment suggests that curious children in groups can train themselves to operate a computer at a basic level without formal instruction. It means that you can multiply the effectiveness of teachers many-fold by giving children access to the Internet. In another experiment, Dr. Mitra found that some ninth graders were able to teach themselves physics concepts (such as viscosity) directly from the Internet without the aid of a teacher. The teacher's job, thus, could be to help the children ask the right questions. The slum experiment also teaches that up to a point the English language is not a bar. Dr. Mitra's slum computer had a Hindi interface which gave the kids links to hook up with Web sites in their own language. But the children quickly shut it down and went back to Internet Explorer. Dr. Bose says that they may not know the dictionary meaning of English words, but they quickly achieve

operational understanding—they don't know how to pronounce *File,* but they know that within it are options for saving and opening files. He likens this sort of functional literacy to learning to ride a bicycle. "No one asks you how you learned," he says, "You just did it." His hope is that one day the computer will become as ubiquitous in India as the bicycle. "You don't have to worry about content either," he adds. "Once Indians start surfing, the content will quickly appear in Indian languages, which is what happened with cable TV."

I have two sons. Both are in their twenties and both left to live abroad because our socialist raj didn't create jobs for them during our dark decades. Like most Indian parents, my wife and I would like them to return and make a life at home. Now that India is changing, they have begun to talk of returning. While our older boy, Kim Kanishka, is happy doing advertising in China, the younger one, Puru, has quit his job in New York and is planning to start a "click and brick" company to sell lifestyle furniture to the Indian middle class. Just two years ago, I could not have imagined Puru becoming an entrepreneur, but he's caught up in the spirit of our times, when every young person is willing to risk the security of a job to pursue his passion. He talks like many of his friends about the power of democratic India that has unleashed the market to make more of its human capabilities than ever before possible. Freeing the individual has indeed released vast amounts of energy and creativity. This is now channeled into software, entertainment, remote services, Internet start-ups, as well as Indipop, fashion, cricket mania, and Indian novels in English. These have become "global industries" and they passionately engage Indians everywhere in the world. The hand of family, caste, and the state, which had blocked human possibilities until now, is letting go and Indians are discovering new forms of social and economic organization that make more of their potential.

The twenty-million Indian diaspora consists of Indians spread all over the world and has an enormous appetite for things Indian. Thanks to the global economy and the communications revolution, Indians abroad feel closer to India than ever before. Subhash Chandra of Zee Television realizes this, as we have already seen, and he offers the popular Zee cable channel in many parts of the world. So do a number of spiritual gurus, whose discourses are available to the Indian global community through cable TV and the Internet. Indipop is the fusion of Indian pop music with Western rhythms which first emerged among Indian youth in England and successfully traveled back to India. It has created millionaire pop stars like Daler Mehndi and A. R. Rehman, who routinely travel around the globe entertaining the diaspora. Indipop has also given birth to successful TV channels like VTV, and changed the style and offerings on MTV in India. Many in the diaspora have discovered classical Indian music, which went global a generation ago at the time of the Beatles, with Ravi Shankar and Ali Akbar Khan, but now has become big business; many classical musicians devote a third of their time to concerts overseas.

Indian cinema has always had a market abroad in the Middle East, Russia, and East Asia. Now it is becoming big business in many parts of the world. Cinemas have sprung up which show only Indian films in many cities, and foreign revenue has become important to the film producers of Bombay and Madras. Salman Rushdie and V. S. Naipaul, both products of the diaspora, have made a great impact in literature, and because they write in English, their popularity extends far beyond the diaspora. After the critical and commercial success of Arundhati Roy's *The God of Small Things,* both my

editor and literary agent tell me that Indian fiction in English is a "hot property" among publishers in New York and London. Pankaj Mishra, Rohinton Mistry, Jhumpa Lahiri, and others have recently ridden this wave. The last World Cup of cricket in England in 1999 demonstrated to the cricketing world that the center of gravity of this British gentlemanly game had shifted to the subcontinent. The most popular and noisiest matches involved the teams of India, Pakistan, and Sri Lanka, who were supported feverishly by fans from the diaspora. An English newspaper called it "the invasion of curry." All of these—Indipop, television channels, Indian films, cricket, food, fashion, and even fiction—are, in a sense, the products of the new information economy of India. And the importance of this new economy was a major theme of President Clinton's visit to India in 1999.

One of the consistent themes of the information revolution is that the Internet will diminish the importance of hierarchy of all kinds—political, economic, and social. Since information is power, goes the argument, those at the top of traditional hierarchies—for example, government officials—will not be able to maintain their dominance by controlling access to information. As a result, power will devolve down to the people and liberate millions who either work in or deal with large organizations.

The first signs of this liberation that I have heard come from a friend in Hyderabad, who claims to have bought a plot of land in a nearby village practically through the Internet. Hyderabad is the capital of Andhra Pradesh, whose Net-savvy chief minister has pushed through the computerization of land records in many districts of his state, much against the opposition of his bureaucracy. My friend says that he found the land records, including maps of the plots, on the Net. He downloaded the forms at a cybercafe near his house and within a few months the transaction was completed. To anyone who has ever tried to buy land in India, this is nothing short of revolutionary. Under normal circumstances, the process could take years and entail endless corruption. For the keeper of information is the village revenue official, who controls and manipulates information. Now, the Internet has come and broken this information monopoly of these lower officials; it threatens their incomes and they are not happy.

Most nations think that their bureaucrats are some form of low life. Nowhere do citizens enjoy dealing with their governments; they do it because they have to. But that doesn't mean that the experience has to be dismal. Now there is a new wind beginning to blow through government departments around the world which could take some of this pain away. Within the next five years it may transform not only the way public services are delivered but also the fundamental relationship between governments and citizens. After e-commerce and e-business, the next revolution may be e-government.

Examples abound from around the world. The *Economist* recently reported that the municipality of Phoenix, Arizona, allows its citizens to renew their car registrations, pay traffic fines, replace lost identity cards, and handle many other such transactions online without having to stand in endless queues in a grubby municipal office. The municipality is also happy because it saves $5.00 a transaction—it costs only $1.60 to process an online transaction, versus $6.60 across the counter. In Chile people routinely submit their income tax returns over the Internet, which has increased transparency and drastically reduced the time taken, the number of errors, and litigation with the tax department. Both taxpayers and the revenue department are happier.

The furthest ahead, not surprisingly, is the small, rich, and entrepreneurial civil service of Singapore, which allows citizens to do more transactions online with its government than any other. The purchasing and buying of Singapore's government departments is now on the Web, and cost benefits come through more competitive bidding, easy access to suppliers, time saved by online processing of orders, and lower stocks. Suppliers find tenders and purchase orders on-site, and they can post their catalogues, bid for contracts, submit invoices, and check their payment status over the Net.

The most useful idea for Indian municipalities is GovWorks, a private-sector site that collects local taxes, fines, and utility bills for 3,600 municipalities across America. It is a citizens' site which also provides information on government jobs, tenders, and so on. The city of Valencia in Spain combines government and private-sector activities, where citizens can not only pay local taxes but also pay utility bills, do their banking, check school activities—a sort of interactive version of the yellow pages, and citizens can access it not only through their PCs but also via public kiosks spread around the town.

The ultimate in e-government is, of course, being able to vote online, and the Arizona Democratic primary showed the way as forty thousand people voted via the Web—a 600 percent increase in turnout over the last election. But the election was marred by protesters arguing that the election was stacked against the poor, who did not have computers and who had to stand in line.

Cynics in India say, "Oh, e-government will never work in India. We are too poor and we don't have computers." But they are wrong! There are many experiments afoot in India as well. Chandrababu Naidu, the chief minister of Andhra Pradesh, is clearly the pioneer. A project has also started in seventy villages in Kolhapur and Sangli districts in Maharashtra, where Internet booths have been set up in villages and farmers can check daily market rates of agricultural commodities in Marathi along with data on agricultural schemes, crop technology, and when to spray and plant their crops. It also provides bus and railway timetables, vocational guidance on jobs, applications for ration cards, kerosene and gas burners, and land record extracts with details of land ownership. Sam Pitroda's WorldTel, Reliance, and the Tamil Nadu government are laying 3,000 kilometers of fiber-optic cables to create a Tamil network which will offer school, college, and hospital admission forms, land records, and pension records. If this project is successful, WorldTel will expand it to Gujarat, Karnataka, and West Bengal. In Kerala, all the villages are getting linked online to the district headquarters, allowing citizens to compare the development priorities of their village with those of other villages in the state. E-governance may also not be far behind in India.