

Part One



Global iProperty Context

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Innovating World

Welcome to the Global Innovation Factory

Innovation is now a global phenomenon. It is both a *driver* of globalization, in that it creates the technologies that make globalization possible, and a *consequence* of globalization, which is causing an unprecedented redistribution and expansion of sophisticated innovative capabilities around the world. As a result of globalization, innovative ideas are now more important than ever for developing competitive advantage. One corollary is that protecting these ideas to sustain competitive advantage is also more important than ever. In fact, being better than competitors at protecting valuable ideas is in itself a competitive advantage. And yet, as more and more companies use the world's legal systems to protect their ideas, the landscape becomes more populated with hazards, so companies must also focus their attentions on avoiding the risks created by the iProperty of others.

The protections afforded by various countries are rapidly changing, generally in a positive direction but with frequent setbacks, and the cultural contexts in which these laws are framed and enforced are sometimes difficult for outsiders to understand. Companies must stay alert to and informed regarding the entire global context of protection and enforcement of iProperty in order to thrive. In this chapter, we discuss these and other topics as we set the stage for our discussion of iProperty strategies and tactics by viewing the evolving global economic stage from an iProperty perspective.

WHY THE WORLD IS INNOVATING

Today's innovator companies, whether large or small, local or international, are in a global competition. As such, they must focus on innovation and think about protecting the fruits of their innovation in global terms. Companies that consistently win in the global economic competition will be those consistent innovators with insight into current trends and foresight into how to protect and extend the competitive advantages conferred by their innovative capabilities. Exhibit 1.1 shows six key factors that characterize and shape the way the world does innovation:

1. **Innovation as a driver of globalization.** In today's economy, innovation is probably the key driver of unprecedented economic globalization.
2. **Urgency of innovation.** Economic globalization (global competition) makes innovation more important than ever for developing competitive advantage.
3. **Globalization of innovation.** Economic globalization stimulates the global distribution of sophisticated innovation capabilities.
4. **iProperty risks and opportunities.** Globalization of innovation stimulates the development and use of iProperty that creates new risks and affords new opportunities for every innovator company.
5. **Standardization of intellectual property laws.** Intellectual property laws are becoming more standardized in countries around

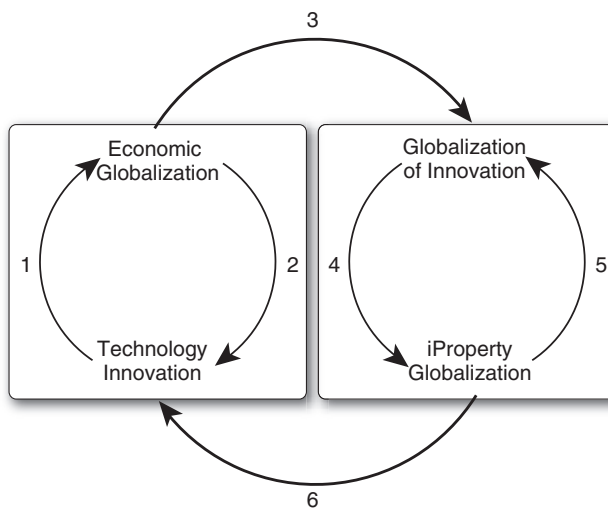


EXHIBIT 1.1 Globalization of Innovation

the globe, but significant differences remain, so innovators must grapple with global iProperty complexities.

- 6. Increasing world economic output.** Globalization of innovation together with globally consistent iProperty standards will stimulate more innovation, advance economic globalization, and increase global economic output.

Innovation Drives Economic Globalization

Innovation is driving unprecedented economic globalization, which creates a variety of opportunities and risks in the iProperty world. How is this happening? To begin with, innovation is driving the global expansion of communication, collaboration, and competition. In *The World Is Flat*, an assessment of the global forces shaping our economic reality, Thomas Friedman writes:

Clearly, it is now possible for more people than ever to collaborate and compete in real time with more other people on more different kinds of work from more different corners of the planet and on more equal footing than at any previous time in the history of the world.¹

Underlying Friedman's list of superlatives is a series of innovations that includes more, faster, and more reliable technologies for communication, more optical cables crossing and satellites orbiting the planet, along with more and cheaper devices such as cell phones and computers for connecting into the global explosion of bandwidth. Better infrastructure and technologies now move people and goods around the world faster and more reliably than ever. Further, many developing countries are playing a game of technology leapfrog, in which they bypass traditional technologies, such as landline telecom systems, and jump to newer technologies, such as wireless communications. In India, for example, it is not uncommon to see farmers riding ox carts and talking on cell phones. These innovations are rapidly eliminating the old national barriers to business and supporting unprecedented, business-driven economic globalization. Yet, as we discuss further in Chapter 2, these innovations also create new threats to companies that want to protect their ideas.

Urgency of Innovation

One important effect of economic globalization is the transition to what Kenichi Ohmae, acclaimed Japanese management strategist, calls a

“borderless business environment.”² “Borderless business” enables companies to access larger markets, but also means that more competitors can access the same customers, thus intensifying competition. The Internet in particular levels the playing field for buyers, removes barriers for sellers to share product and service information, and enables companies previously isolated from one another to compete and collaborate directly, dramatically increasing the efficiency of markets.

Fierce global competition forces firms to source products from countries with lower capital and labor costs, even for products with comparatively high margins, such as pharmaceuticals. Companies in the United States outsource to India; companies in India outsource to Sri Lanka. The resulting difficulty of competing based on price motivates corporate leaders to look to novel ideas as their primary source of competitive advantage to avoid the otherwise inevitable commoditization. A recent Kauffman Foundation report concluded:

Today’s economy is driven by innovation—the development and adoption of new products, processes, and business models. Nations, states, regions, firms, and even individuals compete on their ability to accumulate, aggregate, and apply their assets to create value in new ways for increasingly diverse customers all over the world.³

Baruch Lev, a leading thinker in the area of intangible assets, refers to this phenomenon as “the urgency to innovate.” According to Lev, “given the decreasing economies of scale (efficiency gains) from production . . . coupled with ever increasing competitive pressures, innovation has become a matter of corporate survival.”⁴ And while innovation may confer a competitive advantage, in the rapidly adapting global economy the competitive advantage will be short-lived without some form of protection from those who would simply copy the innovation.

How is the global redistribution of innovation impacting the way your company competes?



Bruce Greenwald, Columbia Business School professor of finance and asset management, and Judd Kahn, chief operating officer of Humingbird Management, LLC, recently emphasized the importance of “barriers to entry” as a force affecting the competitive environment: “It is so dominant

that leaders seeking to develop and pursue winning strategies should begin by ignoring [other forces] and focus only on it. . . . No other feature of the competitive landscape has as much influence on a company's success as where it stands in regard to these barriers."⁵ Lester Thurrow, former dean of the MIT Sloan School of Management, maintains that in addition to copyrights and brands, the "only remaining source of true competitive advantage [is] technologies that others do not have."⁶ Walter Willigan of Pricewaterhouse Coopers echoes this sentiment:

Successful corporations of the next century will not be able to rely solely on the age-old levers of competition viz., labor, capital and land. Rather they will have to supplement the management of these tangible assets with the effective management and exploitation of their intellectual property—patents, trademarks and technology.⁷

While strategic reliance on innovation is most apparent in companies that traditionally have made their living from technological advances in fields such as engineering and chemistry, the urgency to innovate and the corresponding need to use iProperty to protect that innovation impacts all innovating firms whose technologies are as diverse as biotechnology, banking, computer chips, and consumer goods. In a recent article, Michael Schrage, a research associate with MIT's Media Lab, chronicled the technological evolution of toasters. According to Schrage, when it comes to "countertop toasting technology," those who do not differentiate, segment, and innovate are doomed to fail.⁸ He concludes that rather than signaling the commoditization of a product, intense price competition may signal the need for innovation: "innovate in order to differentiate . . . identify hidden or untapped potential for new value creation." In today's economy, it appears that even toasters must be innovative.

Globalization of Innovation

The quest for innovation has gone global. Innovation hot spots are growing in virtually all corners of the globe. These hot spots provide critical concentrations of geographically localized innovation capabilities—including engineers, scientists, artists, entrepreneurs, and product manufacturing capabilities—and provide their host cities with international competitive advantage.⁹ Businesses can find inexpensive services, from mechanical engineering to pharmaceutical scale-up and manufacturing. A recent article in *The Economist* concluded that China and India, hosts of many of the new innovation hot spots, are "changing the

very process of development.” The article predicts that “the rise of India and China as centres of innovation will radically shake up the technology industry that is today based mainly in rich countries.”¹⁰ The Organization for Economic Co-operation and Development estimates that by the end of 2006, China will be the second-highest investor in research and development (R&D), with investments by government and business surpassing \$136 billion.¹¹ Further, we expect that the emergence of microfinancing, very small amounts of money supplied to individual entrepreneurs, will have massive impact at the grassroots level. These large and small investments are sure to fuel the growth of existing innovation hot spots as well as the development of new ones.

Consider Albany Molecular, Inc. (AMRI), a leading chemistry-based drug discovery, development, and manufacturing company. Begun in 1991 and now employing approximately 850 employees, AMRI focuses on tools and processes for the discovery of new small-molecule prescription drugs. Many of its clients are large pharmaceutical companies that are offshoring innovative drug discovery and development work. Realizing that its customers needed more cost options, AMRI recently opened state-of-the-art chemistry innovation facilities in Hyderabad, India, and in Singapore, two leading global innovation hot spots. Now, when quoting work, AMRI offers its pharmaceutical company clients a three-tiered price structure, typically with the United States as the highest price, Singapore in the middle, and India at the bottom. Customers choose the price that they are willing to accept based on such factors as sophistication of the workforce relative to the work at hand, cultural and legal protections for innovations, ease of communication, and others.

The recent economic revitalization of Silicon Valley has been attributed in part to the expansion of global innovative capabilities. One evidence of the influence of globalization on Silicon Valley is the number of patents originating there with inventors from other locations around the world. The Silicon Valley Index reports growth in the number of patents naming Silicon Valley inventors along with inventors from other countries.¹² According to the Index, this “co-patenting” by valley employees and foreign collaborators increased sixfold from 1993 to 2005. Most foreign coemployees are from India, China, Italy, Hong Kong, Finland and Taiwan. A Scripps News article observed that “Globalization is helping to expand the valley’s economy, rather than threatening it.”¹³ Thus, competition and collaboration with global innovation hot spots appear to be having a positive effect on innovation in Silicon Valley. Scripps News concludes that “[d]espite some predictions that Silicon

Valley would lose out because of globalization, the region is keeping its lead as a capital of technology investment and employment.”¹⁴

iProperty Risks and Opportunities

The rapid global spread of innovation provides companies with low-cost sources of innovation that never existed before. But companies are also more likely to face competitive risks from places that would not have been considered 10 years ago. These threats may result from two facts: (1) competitors are moving their own centers of innovation to less expensive hot spots around the globe, and (2) new homegrown competitors are arising out of these innovation hot spots. For example, iProperty threats may arise from:

- Outsourcing or offshoring strategies that locate critical technology in countries lacking sufficient legal protections or an employee culture that values iProperty, with a resulting risk of iProperty loss
- Competitor setting up manufacturing operations to make a copy-cat product in a country where the innovator has no meaningful iProperty protection
- Competitor selling products in markets in which the innovator has passed up the opportunity to obtain patents
- Escape of valuable trade secrets, know-how, and other iProperty from an offshore operation when employees leave to work for a local competitor or to start their own company
- Litigation, such as a patent infringement suit, initiated in your country by a company from a distant innovation hot spot

These and many other potential threats are increasing in probability due to economic globalization, the increasingly global expansion of innovative capabilities, the high mobility of brain power, and the increasingly densely populated global patent landscape.

In 2005, a record year for international patent applications at the World Intellectual Property Organization, South Korea surpassed the Netherlands in the number of international applications filed, and China surpassed Canada, revealing a definitive shift to the East.¹⁵ Companies competing for the future based on their innovative products and services cannot afford to dismiss the importance of this change. The world's patent landscape is being dramatically reshaped as it is rapidly being populated

by patents originating from companies in a new set of countries with growing innovative capacity. Companies that are comfortable looking only in their own backyards for iProperty competition are likely to be surprised, to say the least. These issues are explored in more detail in Chapter 2.

Lagging Legal Standardization

Businesses now operate in an economic world in which political and geographic boundaries are increasingly devoid of meaning. Generally speaking, innovative goods and services and the funds that buy them flow freely from country to country. But, with a few exceptions, the legal systems that protect the ideas embodied in those goods are still firmly fenced in. There is no global system of intellectual property rights. Intellectual property systems come in all shapes and sizes. And even where the legal standards apparently are similar, the cultural contexts in which those laws are enforced continue to vary widely.

In 1994, the World Trade Organization (WTO) proactively (with pressure from western countries) and profoundly changed the future of global intellectual property standards with its Trade Related Aspects of Intellectual Property Rights Agreement (TRIPS). As described in the TRIPS preamble, the objectives of the agreement are threefold:

1. Reducing distortions and impediments to international trade
2. Promoting effective and adequate protection of intellectual property rights
3. Ensuring that measures and procedures for enforcing intellectual property rights do not themselves become barriers to legitimate trade

The TRIPS agreement is widely recognized as the most significant intellectual property accord of the twentieth century.¹⁶ Among other things, TRIPS requires countries to treat nationals and foreigners equally when it comes to obtaining and enforcing intellectual property laws. The result of TRIPS has been the increasing standardization of availability, acquisition, scope, maintenance, and enforcement of iProperty rights in countries large and small around the globe. For example, India and China both made conforming, though not complete, changes to their patent systems in 2005, and China is planning another extensive overhaul in 2007.

When was the last time you had a discussion with your patent counsel about international iProperty developments and their impact on your organization?



Having the laws on the books is one thing. Actually enforcing them is another. Among the tools that the U.S. government has to encourage, push, cajole, and manipulate countries into improving their intellectual property systems is a yearly report card, affectionately referred to as the Special 301 Report.¹⁷ China, for example, always gets failing grades in all subjects. The 2007 Special 301 Report retains China on the Priority Watch List, a distinction that identifies China as a member of the world's iProperty axis of evil. Priority Watch List countries have failures in "IPR [Intellectual Property Rights] protection, enforcement, or market access." In the understated language of diplomatese, the listed country is "the focus of increased bilateral attention concerning the problem areas." In the most recent report, Argentina, Chile, Egypt, India, Israel, Lebanon, Thailand, Turkey, Ukraine, and Venezuela are singled out for special attention.

Because the enforcement problems are often more immediate at a local level (especially in China), the U.S. Trade Representative has recently started giving attention in the Special 301 Report to local protection and enforcement through a special local review. The goal of local scrutiny is to single out pirate hangouts and to pressure responsible governments to start doling out penalties for pirating that are sufficiently serious that they actually serve as a deterrent—rather than the insignificant hand-slapping that is often the result of intellectual property litigation in China today. The 2007 report lists a variety of pirate hangouts from around the globe, from Silk Street Market, Beijing, China, to the triborder region in Paraguay, Argentina, and Brazil.

Another important tool for handling differences in intellectual property standards among countries is the dispute resolution mechanism created by TRIPS. WTO members can bring cases alleging violation of TRIPS provisions by other countries before the WTO. If the case is proved, the losing country may be required to pay damages and/or change its laws. If the losing country does not pay the damages, the winner may impose tariffs on imports from the losing country and pay the proceeds of those tariffs directly to companies that have been damaged by the losing country's violation.

The United States has rarely used the dispute resolution procedures, but there are signs that the U.S. government is turning up the heat. In June 2006, the Trade Representative created a new Office of Intellectual Property and Innovation and appointed a Chief Negotiator for Intellectual Property Enforcement to enhance its focus on protecting and enforcing intellectual property rights. In 2007, the Trade Representative further ramped up the pressure on China by requesting dispute settlement consultations, in part over deficiencies in China's legal regime for protecting and enforcing copyrights. The 2007 Special 301 Report indicates that the United States will consider dispute settlement consultations where countries do not appear to have fully addressed their TRIPS obligations.

Since the mid-1980s, the United States and China have considered intellectual property issues of such critical importance that, in addition to myriad lesser diplomatic efforts, these issues have frequently been addressed in discussions between the chief executives of the two countries.¹⁸ Support appears strong on both sides for strengthening cooperation on intellectual property protection. In a recent meeting with the director of the U.S. Patent and Trademark Office, Chinese officials emphasized that China attaches great importance to U.S. experience in the area of intellectual property protection.¹⁹ The countries have even designated special liaison officers to deal with intellectual property projects, and the United States plans to send experts to train Chinese intellectual property officials. In July 2006, China published revised patent examination guidelines to significantly improve its patent system in such areas as software and chemical patents and the requirement for novelty. Yet China's rhetoric indicates that it is resentful of western meddling in its internal intellectual property affairs. And despite many improvements in its intellectual property systems aimed at improving and harmonizing the relevant laws, many deficiencies remain.

Increasing Global Economic Output

Finally, while a detailed discussion of the important policy topic of increasing global economic output is outside of the scope of this book, we wish to mention here that globalization of innovation capabilities plus improved intellectual property protections around the world can be expected to accelerate an upward economic spiral. Improved legal, political, and cultural protections for intellectual property will stimulate further investments in innovation, which stimulate further innovations, which increase productivity, which yields economic growth, which stimulates

further investment in innovation. In the words of one commentator, “It is by means of enforcing such standards that governments bolster their innovative capacity . . . and not by a propensity to resort to shortcuts.”²⁰

For example, consider Avesthagen, a company in Bangalore, India, that makes generic versions of biotech drugs. The company has built more than 30 alliances and partnerships with industry and government organizations in India and elsewhere, relationships it has leveraged with a growing portfolio of iProperty, including 140 patents and patent applications. In 2007, this record enabled Avesthagen to attract into India a \$32 million investment funded in part by Fidelity International.²¹

In another example, Aptuit, Inc. and Laurus Labs Limited teamed up in 2007 to develop a new drug development company in India, named Aptuit Laurus. The new company will be backed by a \$100 million investment in development, manufacturing, and informatics capabilities. In addition to a significant investment in infrastructure, the deal will add hundreds of high-paying jobs in medicinal chemistry, solid-state chemistry, large-scale pharmaceutical dosage form manufacturing, clinical packaging, and logistics. The companies saw the intellectual property issue as significant enough to mention it in their press release; pointing to the importance of the recent Indian patent law reforms, the press release stated:

The security of IP in the region is further supported by the implementation of the World Trade Organization (WTO) Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) and other steps taken by the Indian government to protect product patents.²²

How the world’s developing economies implement intellectual property policies is not a simple issue. We agree with many commentators that while India, China, Singapore, and other developing countries may be ready for full-fledged intellectual property systems, it would be detrimental, if not impossible, for many of the poorest countries to implement the intellectual property policies of the developed world. However, the value of an effective intellectual property system for attracting investment, creating jobs and valuable products and services, will motivate insightful leaders in developing countries to implement effective policies appropriate to their country’s stage of development. As elegantly stated by journalist David Warsh in his work on the economics of knowledge, *Knowledge and the Wealth of Nations*, “If the intricate system of incentives to create new ideas is underdeveloped, society suffers from the general lack of progress (most of all, the poor). So, too, if these incentives are too lavish or closely held.”²³

FUELING THE GLOBAL SPREAD OF INNOVATION

So far we have outlined the interactive relationship among a variety of trends, including technology innovation, the globalization of innovation, the urgency of innovation, change and stagnation in intellectual property laws and enforcement systems, and the relationship of these trends to global economic health. In addition to these trends, six factors are both influenced by and contributing to the globalization of innovation:

1. The rise of a global “creative class” of knowledge workers
2. Business process outsourcing and offshoring trends
3. The increasing cost of innovation in developed countries
4. The improvement of economies and infrastructures in developing countries
5. The globalization of education
6. The development of government and private initiatives designed to support entrepreneurial businesses

The “Creative Class”

In his book, *The Rise of the Creative Class*, economist Richard Florida introduced the concept of the “creative class.”²⁴ This class, sometimes referred to as “knowledge workers,” includes those creative individuals who become the scientists, engineers, artists, and entrepreneurs who drive innovation-based economic growth. Members of the creative class are the key players in the globalization of innovation. Individuals in this often free-spirited group are motivated by creative opportunities and locations that offer unusual and diverse lifestyle opportunities. In his latest book, *The Flight of the Creative Class*, Florida describes how a discussion with a group of international graduate students about their postcollege plans influenced his thinking about the global redistribution of the creative class:

The more we probed the issue, the more concerned we became. These young people were only the tip of the iceberg. Not just for them, but for established scientists and engineers, for entrepreneurs and employees, for artists and cultural mavens, America was no longer the only place to be. This was doubly true of our foreign-born students, on whom we depend to help build our scientific enterprises, and of immigrant employees and entrepreneurs, who power so much of our growth. The balance of the world’s creative brainpower was shifting.²⁵

What is your company doing to attract and retain its share of the global creative class?



Countries around the world have for years been losing talent to the United States and Europe. A study by Viveck Wadhwa of Duke University and others highlights the contribution that these immigrants have made to the U.S. economy in particular.²⁶ According to Wadhwa, the percentage of patents filed by foreigners (non-U.S. citizens) living in the U.S. tripled in the past decade. A large proportion of patent applications listing at least one foreign national for large patent holders list at least one foreign patent applicant, for example:

- Qualcomm Inc., 72%
- Merck & Co., 65%
- Exxon Mobile Corp., 48%
- The U.S. government, 41%

These same countries are now growing their own high-tech and biotech sectors, and they are also working hard to lure their expatriates back home. Both China and India have a diaspora of millions of expatriates who can serve as a resource for their countries' development in terms of capital, business know-how, education, and advanced technological knowledge.²⁷ The Chinese Academy of Sciences has started awarding "fellowships" to attract Chinese expatriates back home in a program called "the hundred talents program."²⁸ The National Association of Software & Service Companies estimates that about 25,000 Indian techies returned home between 2001 and 2005.²⁹ One report indicated that in a survey of Indian executives in the United States, 68 percent were looking for opportunities to return to India. A similar study of graduates of the All India Institute of Medical Sciences found that 40 percent of graduates living abroad were ready to return.³⁰

Immigration problems in the United States are also forcing many high-value immigrants back home. About 1 million foreign nationals were awaiting decisions on permanent residency in 2006, including 500,000 highly skilled immigrants, but, for example, one important type of permanent visa, the EB visa, is capped at 120 per year.³¹ According to Wadhwa:

We've brought in highly skilled people and given them training in American business and marketing savvy, and then forced them to go back home and start competing. Companies lose talent, and workers are resentful and angry. It's a lose-lose situation.³²

And the more expatriates return home to start and grow technology companies, the more jobs are created for other highly educated scientists and engineers who want to return or stay at home. The net effect is a further redistribution of the capacity to produce sophisticated innovations to a broader group of countries around the globe.

Outsourcing

Outsourcing and offshoring of skilled and unskilled jobs is also contributing to the spread of innovation hot spots. A recent survey of 700 companies by Enterprise Systems found that more than 33 percent of respondents are currently outsourcing some or all of their applications, services, or operations and about 43 percent are currently evaluating outsourcing providers.³³ This important trend results in the channeling of money into developing economies, where it often funds infrastructure and builds communities that are attractive to creative workers. Moreover, creative workers are needed to develop and maintain the technologies that make it possible to connect low-skill outsourcing centers to their customer base, largely in the developed world. Outsourcing operations are training a new class of creative workers and contributing to the redistribution of creative capacity around the world.

Cost of Innovation

An important and more recent trend is the outsourcing or offshoring of innovation jobs. As innovation hot spots emerge in low-cost labor markets around the world, businesses have more options than ever for outsourcing or offshoring innovation. The cost of human talent is typically much less in developing economies. For example, an Indian graduate typically costs about 12 percent of the cost of an American graduate.³⁴ As a recent article in *The Economist* stated: "The bottom line is that you can buy almost 10 Indian brains for the cost of one American one."³⁵ We recently spoke with a Ph.D. biotech scientist who moved back to India after working at a U.S. biotech firm for several years. His Indian salary is about one-fifth the amount he was paid in the United States. In India, he has the same skills, access to the same high-tech equipment, and he is surrounded by the

same quality of scientists as he was when working in the United States. His innovative capacity is available in India for a fraction of the cost of those same skills in the United States. And his salary enables him to maintain an acceptable standard of living in his home country, where he can be closer to his family and raise his children within his preferred culture.

Growing Infrastructure

As already suggested, outsourcing and offshoring trends are enabling local economies to build attractive work environments for their creative workers, thereby enticing educated expatriates back home. Infosys Technologies Limited (ITL) is one of many examples. The company is headquartered in Bangalore, India, another innovation hot spot, where magnificent metallic structures housing global businesses are built amid the remains of an ancient civilization and surrounded by abject poverty. Thomas Friedman describes ITL's global conferencing center as "ground zero" of the Indian outsourcing industry: a cavernous wood-paneled room with cameras in the ceiling for teleconferencing and a massive super-size flat-screen TV that can pull together ITL's entire supply chain—New York, London, Boston, San Francisco, Singapore—all at once, all live.³⁶ As compared with locations in other countries, companies in outsourcing hot spots have better access to building materials, such as steel and concrete, as well as better roads, cleaner water, more reliable electricity and communications, and other components of infrastructure. The infrastructure that underlies and is enabled by the economics of outsourcing is also a fundamental enabling technology for the global distribution of innovation.

Improving Education

The universities of the United States and Europe have traditionally been the key destinations for top students from developing economies, such as China and India. After leaving school, many of these students remained in the West to enjoy the standard of living, and many created companies, raised venture capital from here and abroad, and built companies that added new products and services to the economy. But now higher education is "going global."

Universities in developing nations, such as the Indian Institutes of Technology, often referred to as the MIT of India, are earning top ratings, and many have close ties to top U.S. and European Union universities. At the same time, western universities are offering creative local options

for overseas students. For example, Duke University in Durham, North Carolina, and the National University of Singapore opened a medical school in Singapore, its first graduate medical school, and Duke plans to open a second medical school in Beijing. Moreover, the cost of education in developing economies is much less than that in developed economies.

One measure of success in a nation's efforts to improve its homegrown innovation capacity is the increase in the awards of doctoral degrees, particularly in the sciences, from domestic institutions.³⁷ China, for example, moved from essentially zero in 1985 to almost 7,500 domestically awarded doctorates in 2000. South Korean awards increased from 128 to almost 3,000 in roughly the same period. A related measure is the number of scientific papers published in peer-reviewed journals. In 2003, for example, authors from China, Singapore, South Korea, and Taiwan published 55,300 papers in the American Chemical Society's journals, up from 7,200 papers in 1998.³⁸ Because it is no longer necessary for students to travel to the United States and Europe for top-rated educations or to put those educations into use, many of the world's best minds are comfortable staying right at home.

Governmental and Nonprofit Initiatives

In view of the economic gains created by centers of innovation, governments are spending their nations' hard-earned cash to create their own centers for attracting creative workers from around the world. Biotechnology centers are representative of this trend. The *Chicago Tribune* recently reported that biotech centers are springing up across the globe, from Australia to Toronto and Singapore to Amsterdam.³⁹ Until recently the United States accounted for most of the world's biotech investment, but countries around the world are using government subsidies to attract biotech companies and the investments and jobs that go along with them. Interestingly, venture capital funds are starting to flow to these new hot spots (e.g., in China and India), to take advantage of the low cost of R&D.

PLAYING THE GLOBAL iPROPERTY GAME

Participating in this global competition, although a serious business endeavor, is in many respects a game: the iProperty game. Innovator companies must make an expensive investment in iProperty chips. Players place the chips, technology and market bets, in a strategically selected set of

countries on a worldwide playing board. Once chips are placed, they can be removed, but they cannot be moved to other countries (i.e., protection efforts can be abandoned, but if not initiated in other countries in a timely manner, the opportunity for protection in those countries may be lost). The usefulness of a specific placement of chips is subject to a high degree of uncertainty. Attempts to place a chip are not always successful (i.e., the expected protection may not materialize despite the investment or the technology may fail). Even when a chip is successfully placed, it may not have its intended effect (e.g., legal protections may be established but not successfully enforced). An iProperty chip may be trumped by a superior chip placed by another player (e.g., even if a patent is granted, a competitor may have superior patent rights that block the company from exploiting its own patent). Threats will arise in countries where no patent chip was placed (i.e., unless all economically viable countries are protected, copying *will* occur in countries where the company has not invested in protecting its ideas). The most successful companies in this economic game will be those that innovate well; they will have more chips to play with than their less innovative competitors. And among companies that innovate well, those companies that are masterful at protecting the resulting ideas in the complex global arena will have a competitive advantage (i.e., ownage) over those that are not.

NOTES

1. Thomas Friedman, *The World Is Flat: A Brief History of the Twenty-first Century* (New York: Farrar, Straus and Giroux, 2006), 8.
2. See Kenichi Ohmae, *The Next Global Stage: The Challenges and Opportunities in Our Borderless World*. (Upper Saddle River, NJ: Wharton School Publishing, 2005).
3. The 2007 State New Economy Index, The Kauffman Foundation with the Information Technology and Innovation Foundation (2007), 4–5.
4. Baruch Lev, *Intangibles: Management, Measurement, and Reporting* (Washington, DC: Brookings Institution Press, 2001), 14–16.
5. Bruce Greenwald and Judd Kahn, *Competition Demystified: A Radically Simplified Approach to Business Strategy* (New York: Penguin Books, 2005), 5.
6. Lester Thurow, *Fortune Favors the Bold: What We Must Do to Build a New and Lasting Global Prosperity* (New York: HarperCollins, 2003), x–y.
7. Walter Willigan, “Leveraging Your Intellectual Property: A Proved Path to Value Extraction,” PricewaterhouseCoopers LLP, 1998.
8. “The Myth of Commoditization,” *MIT Sloan Management Review* [0](Winter 2007), 10–14.
9. See Michael Porter, *The Competitive Advantage of Nations* (New York: The Free Press, 1990), 580.

10. "Thinking for Themselves: India and China Aim to Challenge Western Tech Firms Through Innovation, Not Just Cheap Labour," *The Economist* (October 22, 2005), 15.
11. Organization for Economic Co-operation and Development, "China Will Become World's Second Highest Investor in R&D by End of 2006, Finds OECD," press release, April 12, 2006, www.oecd.org/dataoecd/37/18/37770382.xls.
12. Joint Venture Silicon Valley Network, "The Silicon Valley Index" (San Jose: Joint Venture, 2007).
13. Caroline Said, "Silicon Valley Hits Another Boom Cycle," *ScrippsNews*, February 2006, www.scrippsnews.com/node/19085.
14. Ibid.
15. World Intellectual Property Organization, "Exceptional Growth from North East Asia in Record Year for International Patent Filings," press release, February 3, 2006.
16. For a helpful account of the events leading up to TRIPS and its impact on intellectual property policy, see Pat Choate, *Hot Property: The Stealing of Ideas in an Age of Globalization* (New York: Alfred A. Knopf, 2005), chapter 8. In fact, despite the somewhat misleading title, the entire book is well worth reading for anyone who wishes to understand the evolution of intellectual property laws in the twentieth century.
17. See William Alford, *To Steal a Book Is an Elegant Offense: Intellectual Property Law in Chinese Civilization* (Stanford, CA: Stanford University Press, 1995), for a review of the history of how the United States used the Special 301 Report to pressure Taiwan to improve its intellectual property laws in the 1980s.
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