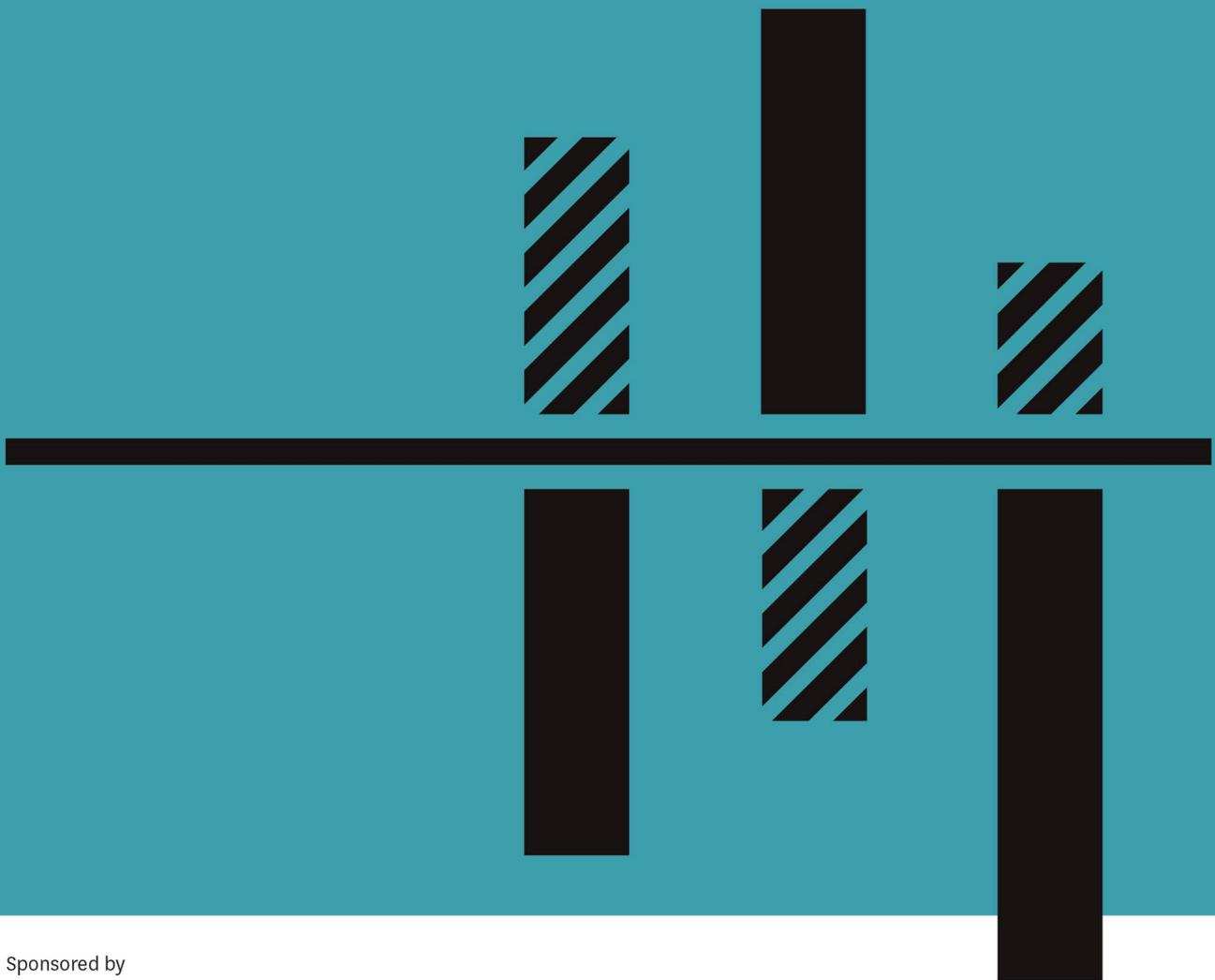


ASIA: THE FACE OF INNOVATION



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ASIA: THE NEW FACE OF INNOVATION

Leading companies around the world are leveraging Asia's energy and talent to develop new products, services, and business models that drive growth.

The Innovation Imperative

As one industry after another is disrupted by new technologies, new business models, and new entrants into the marketplace, companies are scrambling to innovate and stay ahead of the competition. Their focus isn't just on research and development, but on incorporating innovation into every facet of their operations.

Increasingly, they are siting those operations in close proximity to suppliers, distributors, customers, competitors, and supportive government agencies, creating industry-specific ecosystems where the combined experience and expertise of the entire group helps position all of its members on the leading edge of the innovation curve. Many are finding—or building—those ecosystems in Asia.

Why Asia? What differentiates it from other parts of the world? Business leaders and academics cite a wide range of factors, but three appear to be key: a regional economy that is growing many times faster than developed Western economies, robust and growing demand for products and services not only from the deep and wide range of manufacturers domiciled in Asia but also from the region's fast-growing middle class, and strong support for the business community from governments that recognize the crucial role innovation plays in growing both companies and economies.

In addition, they cite access to a diverse and highly educated workforce, proximity to customers, a nurturing environment for startup businesses, and the rapid development and transfer of ideas that result when many companies in the same industry are clustered in one region. All this creates an environment that not only supports but also drives creativity and ingenuity.

In fact, three Asian countries—South Korea, Singapore, and Japan—rank among the top 10 countries in the world in the Bloomberg 2017 Innovation Index, which scores economies on factors such as research and development spending and concentration of high-tech companies. South Korea ranks first. China earns the nod as the world's highest-ranking emerging market. Singapore also ranks as the sixth most innovative nation in the world as measured by The Global Innovation Index 2016, published by Cornell University, INSEAD, and the United Nation's World Intellectual Property Organization. [FIGURE 1](#)

**SOUTH KOREA,
SINGAPORE, AND
JAPAN RANK AMONG
THE TOP 10 COUNTRIES
IN THE WORLD IN THE
BLOOMBERG 2017
INNOVATION INDEX**

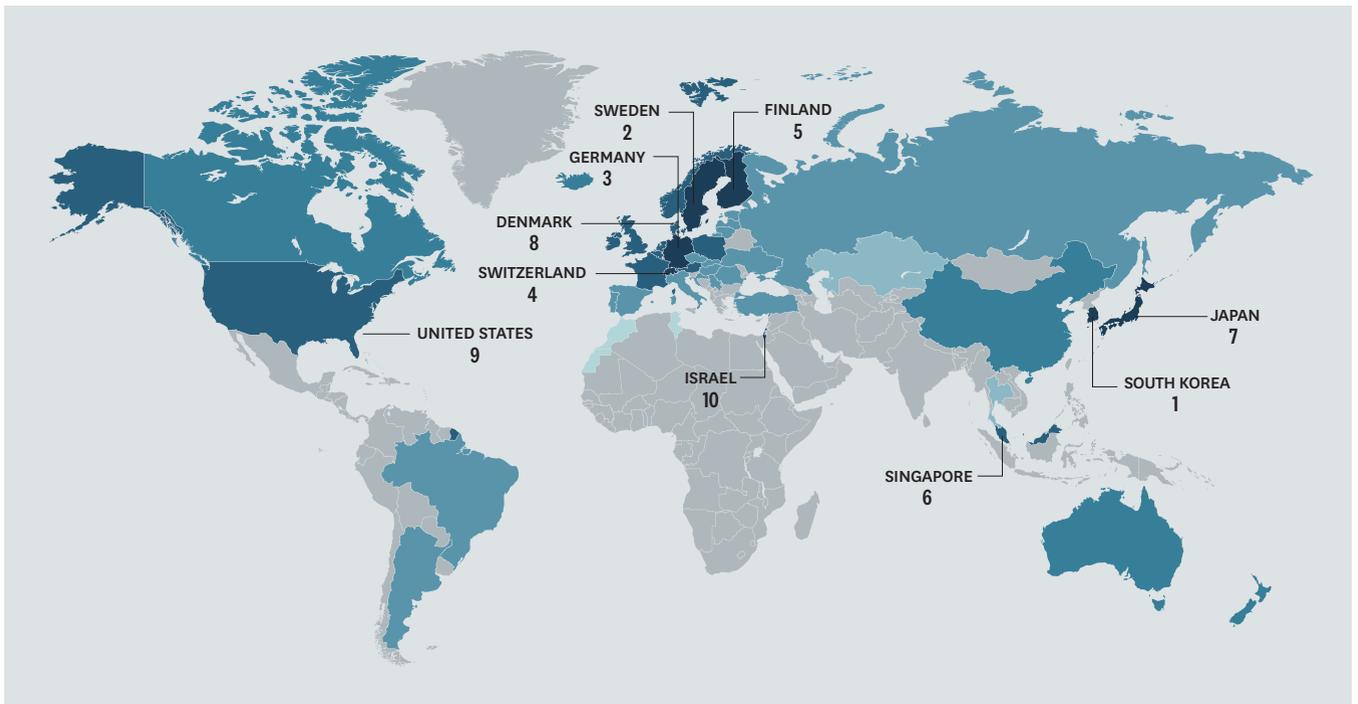
“These days, we are seeing new centers of innovation emerge, such as Singapore, that complement the innovation happening in other parts of Asia.” — Sumner Lemon, Sales Director, Asia-Pacific and Japan, Intel Corp.

FIGURE 1

THE FIFTY MOST INNOVATIVE ECONOMIES

South Korea, Sweden, and Germany top the list; Israel moved into the top 10 for the first time.

INNOVATION RANK



SOURCES: BLOOMBERG, INTERNATIONAL LABOUR ORGANIZATION, INTERNATIONAL MONETARY FUND, WORLD BANK, ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, WORLD INTELLECTUAL PROPERTY ORGANIZATION, AND UNITED NATIONS EDUCATIONAL, SCIENTIFIC, AND CULTURAL ORGANIZATION

“Asia has always been part of our innovation strategy because the region has long been a global center of technology innovation,” says Sumner Lemon, sales director, Intel Asia-Pacific and Japan, for semiconductor pioneer Intel Corp. “Historically, much of that innovation has come from Korea, Japan, India, Taiwan, and China. These days, we are seeing new centers of innovation emerge, such as Singapore, that complement the innovation happening in other parts of Asia.”

To find out how Asia is helping drive innovation in the business world, Harvard Business Review Analytic Services interviewed senior executives at 12 leading companies with extensive operations throughout the region. Informed by their experience, this white paper examines Asia’s role in business innovation through a variety of lenses, including:

- What innovation means at leading companies today.
- The key components companies need to create leading-edge innovation platforms that can help them take advantage of all that Asia has to offer, including not only fast economic growth but also a burgeoning, tech-savvy middle class and a fast-expanding knowledge base.
- The many Asian companies that have created environments that support these innovation platforms, which in turn has led to the development of industry-specific ecosystems in which vendors, suppliers, and manufacturers cluster in distinct, innovation-rich locations.
- Real-world successes at companies that are already taking advantage of Asia’s innovation ecosystems to stay a step ahead of the competition. Their stories suggest a path forward for others that wish to unlock Asia’s benefits and embed innovation more deeply in their own organizations.

Innovation Redefined

In a world where new technologies, from mobile communications to artificial intelligence, are upending traditional business models, companies understand they must work more quickly and smarter to satisfy customers who increasingly expect more from them. For many, this has required expanding the definition of innovation beyond research and development to embedding an innovation mindset in every aspect of their operations, from manufacturing to product and service delivery. Or, as Shigeharu Matsuzaka, managing director of Mitsui Chemical Asia-Pacific (MCAP), one of the regional headquarters for Japan’s Mitsui Chemicals Inc., puts it, “We need to be innovative on both our internal processes and external solutions to stay competitive.”

Different companies emphasize different areas, of course, but the goal is always the same: to create new ways to meet customer needs and win their business.

At Dublin-based medical technology and services company Medtronic PLC, for example, innovation today includes developing new strategies to help customers deliver more seamless, integrated care to their patients and achieve better patient outcomes, using Medtronic products and services. To that end, Medtronic in 2013 opened its global Center of Excellence for Business Model Innovation in Singapore, where it now designs, tests, and scales new business models for Asia’s rapidly growing developing economies—models that systematically address barriers to market growth. Examples include disease-specific patient care pathway models like the company’s “Healthy Heart for All” program in India. In that program, Medtronic works with local hospitals and physicians to remove barriers to heart rhythm and vascular treatments. To date, more than 1,200 physicians have been trained, more than 147,000 patients have been screened, and more than 14,000 patients have received treatment.

“We needed a place where we could be sure we would be inspired to develop new approaches, new forms of innovation, and new partnerships in order to transform the future of healthcare,” says Bob White, president, Asia-Pacific, Medtronic. “We selected Singapore because of its strong reputation as a strategic business hub for the region—one that features developed infrastructure, connectivity, political stability, open business policies, and a skilled workforce.”

INNOVATIONS EMERGING OUT OF ASIA

3M Singapore

3M Singapore developed a new type of lighting—the 3M Channel Lighting System—at its 3M Smart Urban Solutions Lab, where the company is focused on addressing the megatrend of urbanization. With the channel lighting system, a single LED light source is evenly distributed across a 10-meter-long aluminum duct that features openings allowing light to exit the structure. Illustrating the tight partnerships that often develop between the Singapore government and local businesses, Singapore’s Housing Development Board agreed to conduct trials of the lighting system last year at some of its corridors in Yuhua, Jurong. 3M credits the trials with helping it refine the product and prepare it for commercialization.

Instead of spending time creating solutions that are “perfectly structured, pondered over, and redone until perfected,” says Annie Choy, managing director, IBM Singapore, companies today often must **“move faster, become more agile, develop things on the fly, and fix them along the way.”**

For Intel, innovation includes rethinking its own identity. “We recognize that the products and strategies that made Intel successful in the past won’t necessarily ensure our continued success in the years to come,” explains Lemon. “That’s why Intel is focused on transforming into a company that powers the cloud and billions of smart and connected devices. We understand that if companies aren’t willing to embrace change and adapt, they will be disrupted.” In addition to pursuing innovation internally, Intel also is partnering with companies in other industries, including manufacturing, financial services, and healthcare, to find innovative new opportunities for growth. It is working with German automaker BMW, for example, to develop self-driving cars.

At IBM, embracing innovation outside the R&D lab now means, among other things, taking advantage of new ways to think and work using insights from both structured and unstructured data and, in some cases, developing new products and services at an accelerated pace. Instead of spending time creating solutions that are “perfectly structured, pondered over, and redone until perfected,” says Annie Choy, managing director, IBM Singapore, companies today often must “move faster, become more agile, develop things on the fly, and fix them along the way”—an approach uniquely embraced in many Asian cultures. Choy says innovation at IBM also means finding new ways to engage with customers and address their specific needs. “Competitive advantage will no longer come from refining business models,” she explains, “but from transforming the client experience [and] catering to the ‘customer of one.’”

Pepperl+Fuchs, a German multinational that makes a wide variety of industrial sensors and related products for factory applications, and also process automation products for hazardous areas, shares this view. The company is intently focused on finding innovative ways to improve its manufacturing and business processes and develop new service offerings, transforming what was once a purely hardware company into a hardware and services company. Its goals include reducing costs and facilitating R&D activities, sure, but it also wants to improve customer experiences, notes Juergen Seitz, managing director of Pepperl+Fuchs Asia Pte. Ltd. in Singapore. In support of that effort, the company has been automating its manufacturing processes to eliminate quality issues associated with manual methods. It also is exploring new ways to help customers capitalize on the data captured by Pepperl+Fuchs sensors and sensor systems used in factory automation applications. And recently, it opened a global distribution center in Singapore—already its production hub in Southeast Asia—featuring both an intelligent warehouse management software system and an automated storage and retrieval system enabled by internet of things technology. Already, Seitz says, this has reduced the number of warehouse operators required, increased the quality of deliveries—it gets the right box to the right address at the right time—and allowed the company to “pick” more products without expanding its warehouse footprint. It also has given the company the flexibility to launch direct delivery to customers in the Asia-Pacific region.

Creating an Innovation Platform: People, Policies, and Resources

Aspiring to innovation is easier than realizing it. Successful companies understand that to embed innovation across an entire organization requires building an innovation platform—resources, policies, and procedures that bring people and ideas together and encourage and enable creativity. Key elements in such platforms include people with the right skill sets and a corporate commitment to innovation backed by policies and programs that encourage it. This includes providing access to the funding, time, tools, and technologies that enable innovation and, in many cases, compensation incentives for innovative work. As many companies have found, clustering multiple functions and people with diverse skill sets in a single location also can help create an environment that fosters innovation.

PEOPLE

For most companies, innovation starts with people—individuals who are both capable of innovating and willing to work at it, not just individually but also with others. “We believe that collaboration is crucial to the success of our innovation engine,” says Dr. Jeffrey Tung, head of research and development for Southeast Asia at U.S.-based 3M Co.’s Singapore office. “We look for talent that can work closely together to collaborate, debate, and reach a consensus. We foster innovation by promoting collaboration as the 3M way of life.”

With its strong emphasis on education, Asia provides a ready supply of people prepared to contribute to the innovation cause. According to the latest World Economic Forum Human Capital Report, two Asian countries—Japan and Singapore—rank in the top 15 globally in terms of how well they are developing and deploying talent. Japan ranks fourth, trailing only Finland, Norway, and Switzerland, while Singapore ranks 13th. The United States ranks 24th.

In choosing a home for its planned new “smart factory,” Japan’s Makino Milling Machine Co. selected Singapore, says Makino Asia President and CEO Neo Eng Chong, in part because it provides access to a highly competent workforce, both homegrown and imported. “If need be, it is easy for us to persuade specific talents from other regions to come work in Singapore,” Neo explains. “Singapore is a highly attractive city to work in, especially if you think about language and livability.”

In fact, many Asian countries, including Japan, South Korea, and Hong Kong, are recognized for being competitive in attracting talent from around the globe and providing an appealing environment in which to work and live. Many of these countries are bilingual and multilingual, too. In Malaysia, both Malay and English are compulsory subjects in school. English is one of the official languages in both the Philippines and Hong Kong. In Singapore, education policy promotes dual-language learning, and almost all Singaporeans are bilingual, typically speaking English as well as one of the country’s three other official languages: Malay, Mandarin, and Tamil.

INNOVATION POLICIES, PROGRAMS, AND INCENTIVES

Finding people with the ability to innovate is one thing. Providing them with the opportunity and incentive to do so is another. While companies can’t build the inner passion characteristic of great innovators, Monica Maestre of pharmaceuticals giant Merck & Co. points out that companies can create an environment that promotes and facilitates innovation, freeing those who do have the requisite passion to pursue it. At Merck, where Maestre is associate director of regional marketing for Asia-Pacific and also the region’s commercial innovation lead, creating this sort of innovation culture begins with letting employees know not only that they are encouraged to innovate but also that they can do so without fear of failure. Giving people license to fail, she argues, actually gives them license to win, too.

INNOVATIONS EMERGING OUT OF ASIA

Evonik (SEA) Pte. Ltd.

Evonik (SEA) Pte. Ltd., the Southeast Asian arm of German specialty chemicals company Evonik Industries, credits its development of high-performance additives for the coating industry—in particular, plastic coatings for the electronics industry—in part to having a physical presence in Asia, where most electronics manufacturing takes place. “Some of our success stories so far stem strongly from understanding the existing value chain of our industry in Asia,” says Dr. Sher-Lin Ee, head of innovation networks and communications for Evonik (SEA) Pte. Ltd.

INNOVATIONS EMERGING OUT OF ASIA

Micron Technology Inc.

Semiconductor manufacturer Micron Technology Inc. recently entered the market for 3D NAND, a new breed of flash memory in which manufacturers stack capacitors in layers rather than simply squeezing what will fit onto a single plane. Almost as impressive as the technology itself was how quickly the U.S.-based company was able to bring it to full-yield production last year—about five months after development, or roughly half the time needed for many previous technologies. Micron Vice President for Global Manufacturing Wayne Allan attributes the accomplishment to the unique environment in which it took place: the company's Singapore Center of Excellence, where, he says, ready access to talented employees from a wide range of disciplines and backgrounds allowed him to assemble a highly creative team to guide the process. Getting to market quickly and ahead of competitors was a critical win, he adds, because being first leads to more sales at higher prices. It certainly worked in this instance. *Computerworld* magazine reported earlier this year that Micron has already become the world's second-largest supplier of 3D-NAND memory, second only to Samsung, which pioneered the underlying technology.

"Management that is destructively critical when mistakes are made kills initiative," agrees Tung. "And it's essential that we have many people with initiative if we are to continue to grow."

One way Merck, known in Asia as MSD, reinforces this message company-wide is by authorizing low-cost experiments, which simultaneously underscores the importance of innovation while reminding employees they must still seek to minimize risk. The company also incorporates an innovation curriculum into development programs it sponsors for both newer and senior employees. In addition, the company assembles teams of people from its IT innovation hubs and its commercial operations to jointly pursue high-priority projects at a regional level, an approach that multiplies the value of the unique strengths each group brings to the table.

3M recognizes employees for success, too, Tung says, "paying for performance, recognizing outstanding employees, and celebrating success frequently and visibly."

Diversity Helps Drive Innovation

Innovative companies routinely extol the virtue of employing people with a wide variety of backgrounds, and of allowing them to work together and feed off each other's ideas. "One of the most time-tested findings in innovation literature," says Scott Anthony, Singapore-based managing director for Innosight, a strategy and innovation consulting firm, and author of *Dual Transformation: How to Reposition Today's Business While Creating the Future*, "is that magic happens at intersections, when different mindsets, skills, and backgrounds collide together."

Senior executives at many of Asia's leading companies agree:

- "People who come from different backgrounds and cultures think differently and come up with different solutions," says Wayne Allan, vice president for global manufacturing for semiconductor manufacturer Micron Technology Inc., whose U.S.-based headquarters is in Boise, Idaho. "Our center of excellence for nonvolatile memory in Singapore, which is a pretty diverse place, is a great example of how diversity can drive an innovative culture."
- "A diverse workforce is a key success factor in our innovation journey," adds Makino's Neo, noting that Makino Asia has more than 14 nationalities represented at its Singapore location alone.
- "The diverse workforce we enjoy at 3M is an integral part of our innovation culture," says Tung. "This has enabled us to develop a never-ending stream of powerful technologies and solutions that make life better."

Just as having a diverse group of people working together promotes innovative thinking, so does having a diverse range of disciplines working in proximity, which is why many of the world's most innovative companies cluster multiple disciplines in centers of excellence. Micron's Center of Excellence in Singapore, for example, includes front-end manufacturing operations, back-end facilities for incorporating memory chips into assembled products, research and development capabilities, IT operations, and all the other functions necessary to run the company's business.

Financial and Technical Resources Matter

Money matters, too, when building a platform for innovation. Many of the companies interviewed for this report invest substantial percentages of their revenue in research and development—as much as 15% to 20% annually at Germany's Rohde & Schwarz GmbH & Co., a maker of electronic test and measurement equipment. Micron, where an innovation mindset is reinforced by a corporate-wide mandate to "achieve better results than we did in the past," employs compensation schemes with incentive programs that reach all the way to frontline workers on the factory floor. 3M, meanwhile, has for decades offered a "15% time" program that allows employees to dedicate almost a full day a week to their own projects. "This has resulted not only in new products but also the creation of new industries," says Tung.

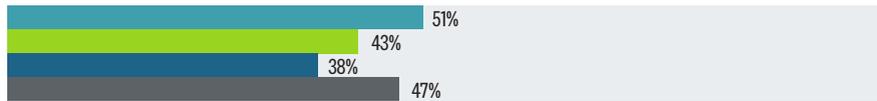
FIGURE 2

ASIAN BUSINESSES BENEFIT FROM THE RIGHT TECHNOLOGY

Do you have the right technology (IT infrastructure and services) needed to compete in the connected economy?

● ASIA-PACIFIC ● EUROPE, MIDDLE EAST, AND AFRICA ● NORTH AMERICA ● LATIN AMERICA

To a significant extent/some extent



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, DECEMBER 2016

Asian businesses also invest in the technology—IT infrastructure and services—needed to compete in a connected economy. A 2016 survey by Harvard Business Review Analytic Services found that 51% of Asia-Pacific companies and the APAC units of multinational corporations say they have the right technology to compete, versus 43% in Europe, the Middle East, and Africa; 38% in North America; and 47% in Latin America. FIGURE 2

51% OF ASIA-PACIFIC COMPANIES AND THE APAC UNITS OF MULTINATIONAL CORPORATIONS SAY THEY HAVE THE RIGHT TECHNOLOGY TO COMPETE

How Asia Supports the Business Community’s Innovation Agenda

While a corporation’s internal mechanics and innovation platform go a long way toward determining how innovative it will be in the marketplace, the environment in which it operates can make a difference, too. Business leaders and academics say a nurturing environment includes a strong education system that produces a skilled and well-trained workforce, proximity to markets, protections for intellectual property, access to capital, government support for both established and startup businesses, and, ideally, a culture of risk-taking. A sound infrastructure, both physical and technological, also is important, notes Josef Parzhuber, president and general manager, automotive aftermarket, at German manufacturer MANN+HUMMEL Group, which makes filtration products and is a development partner and original equipment supplier to the automotive and mechanical engineering industries. “Infrastructure,” he says, “is more than streets, trains, and airports. We also need state-of-the-art digital information and communication technology.”

Asia offers many of these ingredients, and where it lags, it is working quickly to fill the gaps.

ACCESS TO A SKILLED AND EDUCATED WORKFORCE

Asia’s secondary school systems score high in world rankings by the Organization for Economic Cooperation and Development. As measured by the Pisa tests given to 15-year-olds, Asian countries account for the first seven positions in math and the top two spots in both science and reading.¹ The region’s higher education systems score well, too, with Asia placing four countries among the top 10 in producing graduates in engineering, manufacturing, and construction annually. They are Japan (fourth), South Korea (fifth), Indonesia (sixth), and Vietnam (10th), according to the World Economic Forum 2015 and the UNESCO Institute for Statistics. Collectively, these four countries produced more than 556,000 such graduates in 2015, or nearly double the number from the United States, which ranked second behind Russia.

Meanwhile, a September 2016 report commissioned by the Royal Academy of Engineering grouped Vietnam among those countries “punching above their weight,” meaning they are recording higher engineering strength than their recent living

¹ “Pisa tests: Singapore top in global education rankings,” by Sean Coughlan, BBC News, 12/6/16, <http://www.bbc.com/news/education-38212070>

Physical proximity to customers doesn't just make it cheaper to ship products and services to them, it also makes it easier to get close to them and understand **what they want and need**.

INNOVATIONS EMERGING OUT OF ASIA

Pepperl+Fuchs Asia Pte. Ltd.

Pepperl+Fuchs Asia Pte. Ltd., part of Germany-based Pepperl+Fuchs Group, is developing a new generation of smart industrial sensors—Sensorik 4.0—at its Asian headquarters in Singapore. The company sees the sensor paving the way to “Industrie 4.0,” an environment in which all of a company’s components, machinery, and plants are networked together to minimize information gaps, optimize processes, and save resources.

standards might suggest.² The same report showed South Korea among the four countries in the world with the highest number of engineering graduates per capita, along with Russia, Iran, and the Ukraine.

Statistics like those help explain MANN+HUMMEL’s long history in Asia, including two decades in Singapore. The company still maintains its research and development headquarters in China, where many of the large and growing auto and industrial-machines companies that are its customers are located. But five years ago, it relocated its Asia headquarters to Singapore from Shanghai, and last year it selected Singapore to host its global internet of things activities. Its investments in new technology like IoT are being driven by the availability of talent, and that’s an area, Parzhuber says, where Singapore excels relative to many of its peers.

“Singapore is home to some of the brightest developers and entrepreneurs we have seen, with plenty of potential to leapfrog into the global tech scene,” agrees Choy.

Micron, too, relies on Singapore’s pool of talent to help drive its Asian operation. The city-state’s educational system plays an outsized role as a breeder of talent, Allan says, and, as a consequence, it plays an outsized role in Singapore’s value as a home to innovative companies. “The Singapore education system produces highly educated workers across all levels: university, polytechnic, and vocational,” he says. “And those schools work closely with us to understand the trends in our industry and our workforce requirements so they can help us fulfill our needs going forward.” Five or six years ago, Allan notes, Micron began working with Singapore’s universities to make sure they were educating students in the field of big data—not only data collection but also the ability to take that data and rapidly understand what it’s saying. The Singapore Economic Development Board has facilitated and supported those partnerships, he adds.

PROXIMITY TO MARKETS

Physical proximity to customers doesn't just make it cheaper to ship products and services to them, it also makes it easier to get close to them and understand what they want and need—which in turn can help steer innovation efforts in the right direction. “Having our employees in close contact with our customers goes a long way in encouraging our employees to challenge themselves to come up with innovative solutions for our customers,” says Makino’s Neo.

With four of the six biggest manufacturing countries in the world—China, Japan, Korea, and India³—located in Asia, companies that sell to manufacturers find it valuable to locate in the region. “Customer intimacy is a key factor for us,” says MANN+HUMMEL’s Parzhuber. “We can be found where our customers are.”

2 “Engineering and economic growth: a global view,” A report by Cebr for the Royal Academy of Engineering, September 2016, <http://www.raeng.org.uk/policy/international-policy-and-development/gcrf-international-development/engineering-a-better-world-caets-2016/economic-research/executive-findings>

3 “China Solidifies Its Position as the World’s Largest Manufacturer,” Manufacturers Alliance for Productivity and Innovation, 3/30/15 <https://www.mapi.net/blog/2015/09/china-solidifies-its-position-world-s-largest-manufacturer>

Many companies also find it helpful to be physically located in Asia to more easily sell to the region's middle-class consumers, whose ranks are growing exponentially. Homi Kharas, senior fellow and deputy director in the Global Economy and Development program at the Brookings Institution, projects that 88% of the next billion people to join the global middle class will live in Asia.⁴

Many companies see Singapore as an ideal location for reaching this market. "Being the central travel hub, Singapore's excellent geographical location proves to be the most strategic to integrate regional strategies and develop a collaborative network to promote efficiency and competitiveness in Asia-Pacific and beyond," says MCAP's Matsuzaka.

PROTECTIONS FOR INTELLECTUAL PROPERTY

Innovations that aren't protected by law aren't as valuable as they otherwise would be. When it comes to providing protections for intellectual property, much of Asia fares well, with Japan ranking fourth in the world, Singapore eighth, and South Korea ninth, according to the U.S. Global Intellectual Property Center's International IP Index 2017.

Meanwhile, Japan and Singapore both rank among the top 10 countries in the world as measured by the U.S. Chamber International IP Index, which is produced by the U.S. Chamber of Commerce's Global Intellectual Property Center.

"Singapore's strong legal infrastructure with regard to intellectual property protection gives us the edge to lead the forefront of innovation," says 3M's Tung.

While some of Asia's emerging economies are playing catch-up on the IP front, many are making progress—including China, which the Center says has been among several countries introducing notable new enforcement mechanisms and specialized IP courts.⁵

ACCESS TO CAPITAL

In addition to having highly developed banking systems and capital markets that can provide funding for businesses, Asia is the recipient of much external funding from private equity firms and multinational businesses. Developing Asia had record foreign direct investment inflows of \$541 billion in 2015, according to the World Investment Report 2016, which is produced by the United Nations Conference on Trade and Development, making it the largest recipient of such investment in the world.

GOVERNMENT SUPPORT

Most countries try to provide a nurturing environment for businesses, but some do a better job than others at helping drive innovation. Beyond strong intellectual property protections, governments can provide a foundation for innovation by offering financial incentives to companies that locate within their boundaries, by providing a sound physical infrastructure, and by creating programs that help businesses connect with each other and their customers. Many Asian countries offer some or all of these ingredients, with Singapore often singled out for praise by academics and business leaders alike.

"Singapore's government has created very conscious connections between science and companies, between research institutes and companies seeking to use their research, between startups and large companies, between companies in particular industries, and between particular types of companies," adds Anthony.

4 "The unprecedented expansion of the global middle class: An update," by Homi Kharas, Brookings, 2/28/17, <https://www.brookings.edu/research/the-unprecedented-expansion-of-the-global-middle-class->

5 "The Roots of Innovation," U.S. Chamber International IP Index, Fifth Edition, February 2017, http://www.theglobalipcenter.com/wp-content/uploads/2017/02/GIPC_IP_Index_2017_Report.pdf

INNOVATIONS EMERGING OUT OF ASIA

Mitsui Chemicals

Mitsui Chemicals launched its now highly popular TAFMER, an Alpha-olefin elastomer, for commercial and industrial applications in 1971, but the product's real breakthrough didn't come until 1997, when the company commissioned the world's first metallocene catalyst-based polyolefin plant, specifically designed to produce elastomer, in its home country of Japan. This technological innovation, the company says, enabled Mitsui Chemicals to achieve both the production efficiency and broad product range needed to cater to an ever-diversifying global customer base. The company subsequently established its first overseas production facility for TAFMER in Singapore in 2003, and today TAFMER and EVOLUE, a metallocene linear low-density polyethylene based on a unique bimodal process technology, are two key products driving Mitsui Chemical's expansion.

“The Singapore government has a vision for how technology can benefit its citizenry and increase productivity,” says Intel’s Lemon. “It works with business. This creates an environment that facilitates innovation.”

Evidence of Singapore’s commitment to innovation can be seen in its sponsorship of Biopolis, a research and development center for biomedical sciences that hosts leading public and private biomedical research institutes as well as pharmaceutical and biopharmaceutical companies, and Fusionopolis, an R&D complex for research organizations, high-tech companies, and government agencies.

Evonik (SEA) Pte. Ltd., the Southeast Asian arm of German specialty chemicals company Evonik Industries, credits Singapore government-backed Biopolis for providing it with a competitive edge as it seeks to develop new and better ways to meet its customers’ needs. “It is like nowhere else in the world,” says Dr. Ee from Evonik, head of innovation networks and communications in Singapore. “It opens conversations and discussions and allows us to gain insights into the innovative directions of key regional players, as well as the growth aspirations of Asia-focused MNCs.”

For similar reasons, Makino recently chose Singapore as the home for its planned “smart factory,” which will leverage new technologies, including IoT, to improve its productivity and quality metrics and let customers see how such technologies might be applied to their own businesses—especially in China, where many of Makino’s customers are automating their own operations.

“The whole ecosystem in Singapore, combining private-sector expertise and government support, set within a city with excellent infrastructure and connectivity, is ideal for such an initiative,” Makino’s Neo says.

MECHANISMS FOR NURTURING STARTUPS

Recognizing the crucial role startups can play in fostering innovation, and the value of making it easier for startups and established companies to combine their strengths, many Asian countries have programs aimed at providing funding and other types of support for new companies. Singapore’s Block 71—or, more commonly, Blk71—for example, is a hub for startup businesses, venture capital firms, and tech incubators, many in the digital media space. Meanwhile, Singapore’s National Research Foundation provides capital to venture capitalists to invest in local tech startups through programs like the Early Stage Venture Fund. And since 1974, Temasek, an investment company set up by the Singapore government, has owned and managed investments and assets previously held by the government. Anthony notes that many of these companies in turn have built programs of their own to incubate and invest in startups.

In Seoul, meanwhile, the SparkLabs business accelerator has shepherded dozens of companies from throughout Asia through its growth program. Similar incubators can be found throughout Asia, including in the Philippines, mainland China, Hong Kong, India, and South Korea.

A CULTURE OF RISK-TAKING

To innovate is to take risk, and taking risk is deeply rooted in parts of Asia, says Harvard Business School Professor of Business Administration Emeritus F. Warren McFarlan, specifically calling out China. “The notion of risk-taking, innovation, and entrepreneurship is absolutely in the soul of Chinese culture,” he says. “They network, they start, they invest, they take risk. Even at the height of the Cultural Revolution, when things were about as bad as you could think, companies were getting started that have since grown to huge size. It is something literally thousands of years old. Many people think that because China missed the Industrial Age emergence in the 19th century, it is averse to technology. If, however, you look back two or three millennia, you will see that this has been a more technology-friendly, innovative culture than even ours. The highest standard of living in the world in 1800 was not in western Europe, it was in China.”

INNOVATIONS EMERGING OUT OF ASIA

Merck & Co.

Pharmaceutical company Merck & Co. is working with a startup company in Singapore to test a mobile application for oncology patients. Designed to improve survival rates and create a richer engagement with doctors, the app is built around a questionnaire patients answer between appointments with their doctor. This allows patients to identify adverse reactions early and seek treatment if necessary. It also allows their doctor to monitor their condition and spend more time on what matters to them during consultations. Monica Maestre, Merck’s associate director of regional marketing, Asia-Pacific, calls Singapore the “perfect location” for testing these types of solutions because culturally it is a forward-thinking, highly educated society with many early adopters. She also says the city-state’s advanced healthcare infrastructure and strong startup ecosystem contribute to its efforts there.

Pepperl+Fuchs' Seitz says that he's witnessed this risk-taking approach to business firsthand. "Especially in Vietnam and Indonesia," he says, "there's a quite young population with a lot of energy." Now in his fifth year in Singapore, Seitz says his first half year there "was quite an experience" as he learned to appreciate how his Asian colleagues approach their work. "We Germans are always planning 120% of a project, and we want to achieve 130 percent, whereas Asian culture allows you to try something out," he says. "Here we have a certain plan, but maybe we have only thought it 50% through. Nonetheless, we start it, get experience along the way, and realign as necessary. This is quite amazing."

This risk-taking culture also is reflected in Asia's consumers, who are widely recognized for being eager to try new technology.

"From a social perspective, there are a fair number of early adopters here that allow you to test new concepts faster and more easily than in many other places," says Merck's Maestre.

3M has had a similar experience, and now views Singapore as a first market for commercialization of technologies it's developing to deliver clean water, clean air, and energy efficiency. In 2014, it launched its 3M Customer Technical Center in Singapore specifically to drive customer-inspired innovations.

SOUND INFRASTRUCTURE

A sound infrastructure—good transportation, communication and power systems, good water supplies, and well-functioning sanitation facilities—are fundamental building blocks for a thriving business community bent on innovation. Many Asian countries have made impressive commitments to infrastructure, including Vietnam, where public and private-sector infrastructure investment in recent years has averaged 5.7% of gross domestic product, the highest in Southeast Asia, according to the Asian Development Bank. China, meanwhile, has been committing a whopping 6.8% of GDP to infrastructure investment. And in the Philippines, President Rodrigo Duterte is seeking to push infrastructure spending to 7% of GDP.⁶ Singapore, adds Intel's Lemon, "offers an outstanding infrastructure, including excellent 4G coverage and high-speed fiber connections to every home and office building."

All these factors—human resources, proximity to markets, access to capital, supportive government policies—combine to make Asia, and particularly Singapore, an attractive place for multinational companies to site their operations. In the World Economic Forum's Global Competitiveness Index for 2016-2017, for example, Singapore ranks as the most competitive country in Asia, and the second-most competitive in the world, with only Switzerland ranked higher. Japan, Hong Kong, and Taiwan also rank in the top 15 globally.

Building On Asia's Advantages to Create Innovation Ecosystems

Attracted by Asia's welcoming environment, companies from around the globe have flocked to the region, creating business ecosystems that further stimulate and support innovation.

A business ecosystem, as defined by James F. Moore in a 1993 *Harvard Business Review* article, is "an economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world. The economic community produces goods and services of value to customers, who are themselves members of the ecosystem. The member organisms also include suppliers, lead producers, competitors and other stakeholders."⁷

6 "In Asia's Infrastructure Race, Vietnam Is Among the Leaders," by Kai Lester M. Yap and Nguyen Dieu To Uyen, *Bloomberg*, 3/22/17, <https://www.bloomberg.com/news/articles/2017-03-22/in-asia-s-infrastructure-race-vietnam-is-among-the-leaders>

7 "Predators and Prey: A New Ecology of Competition," by James F. Moore, *Harvard Business Review*, May-June 1993, <https://hbr.org/1993/05/predators-and-prey-a-new-ecology-of-competition>

INNOVATIONS EMERGING OUT OF ASIA

Medtronic PLC

To keep pace with changing dynamics in healthcare delivery, Dublin-based medical technology and services company Medtronic PLC is developing what it calls single specialty clinics, or SSCs, out of the global Center of Excellence for Business Model Innovation it established in Singapore in 2013. According to Bob White, the company's Asia-Pacific president, SSCs allow Medtronic to create highly efficient "focused factories" around a disease state and core set of procedures, and also break even financially in one-third to one-half the time required at multispecialty centers. White says the company has already achieved positive momentum in its clinics specializing in heart failure, with more than 2,000 patients enrolled and seeing improvements in drug optimization and functional classification. "We based our center of excellence in Singapore because of the ecosystem, talent pool, and proximity to emerging markets in the region," White says.

The concentration of **energy and expertise** captured by an ecosystem builds on itself, leading to cross-pollination of ideas and fostering innovation.

INNOVATIONS EMERGING OUT OF ASIA

Makino Asia

In 2016, Makino Asia launched an innovative new feature for its machine tools called Spindle Active Care, in which an algorithm ferrets out otherwise hard-to-detect vibration signals in order to identify early-stage defects in the machine's bearings. The technology alerts users to abnormalities or improper usage so that the equipment can be shut down before major damage occurs. This can extend the life of the spindle and eliminate unplanned machine downtime. Makino Asia President and CEO Neo Eng Chong credits Singapore's innovation ecosystem with creating the right environment for innovations like Spindle Active Care to be developed. "Through government initiatives to drive R&D and innovative development, Singapore has always been a magnet in Southeast Asia to attract highly qualified engineering talents," Neo explains. "In addition, Singapore universities and research institutes continuously produce industrial-oriented graduates and experts for local industry. This ecosystem has allowed Makino Asia to grow its desired pool of talents and realize our strategy to stay at the forefront of advanced technologies."

As Moore elaborated, innovative businesses can't evolve in a vacuum. They require resources of all sorts, "drawing in capital, partners, suppliers, and customers to create cooperative networks. ... They work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovations."

In short, the concentration of energy and expertise captured by an ecosystem builds on itself, leading to cross-pollination of ideas and fostering innovation. It is, in the words of Harvard's McFarlan, "a critical mass of people jammed into a small area where there's a lot of networking going back and forth, and a lot of job mobility." In the U.S., famous business ecosystems include Hollywood for the film industry and Silicon Valley for the high-tech industry. In Asia, Taiwan began developing into a home for a semiconductor ecosystem in the 1970s. India hosts an ecosystem for business process outsourcing. More recently, Singapore has become host to a pharmaceuticals and biotechnology ecosystem, with more than 30 of the world's leading biomedical sciences companies using it as a base of operations. In China, an ecosystem for startups has sprung up in the space between Tsinghua and Beijing universities in Beijing China, says McFarlan, with the two public universities serving as overt sources of funding for entrepreneurs. Hangzhou, China, is home to an e-commerce ecosystem anchored by Alibaba Group, but now a plan approved by the State Council of China seeks to broaden the city's appeal globally, calling for the establishment of more than 10 industrial parks and 20 incubation platforms dedicated to cross-border e-commerce by the end of this year.⁸

More such ecosystems are on the way in Asia if businesses have their say. Just this year, Jane's Defence Industry reported that British engine manufacturer Rolls-Royce PLC "is expanding its presence in India with a view to establishing an industrial 'ecosystem' that can develop, build, and support its aero-engines and other products in service with the Indian Armed Forces and commercial sectors."⁹

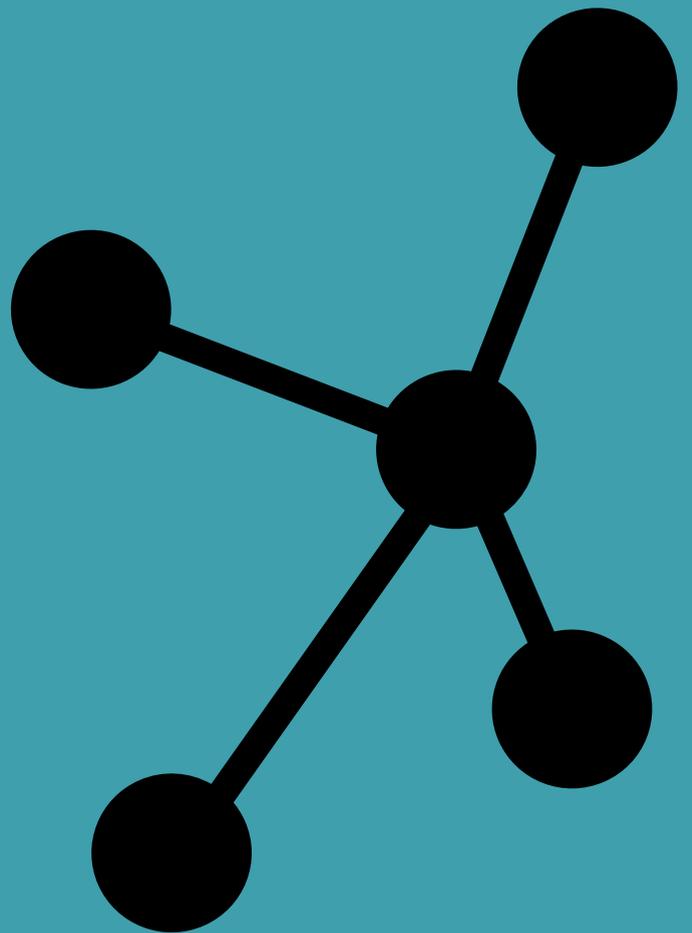
IBM has similar plans for Singapore and blockchain and cognitive technologies. Like many large multinationals, the company has operations sprawled across Asia, and has partnered with government agencies, educational institutions, and other companies in the Philippines, Vietnam, Indonesia, Malaysia, and Thailand. In Malaysia, for example, it developed a nationwide cloud infrastructure for private healthcare provider KPJ Healthcare Berhad to help it provide services to more than 2.5 million people annually.

More recently, though, IBM collaborated with Singapore's Economic Development Board to open the IBM Center for Blockchain Innovation, the first research-led innovation center of its kind in the world. Choy explains that decision by noting that in addition to being one of the world's largest financial hubs, Singapore is "well-trusted, well-organized, and secure, and provides the right business environment for companies to explore new technologies." She adds that the IBM Center for Blockchain Innovation "aims to help make Singapore a top destination for innovation in finance, trade, and commerce, and establish it as a global center of deep competence, expertise,

8 "East Chinese City Constructs Global Cross-Border E-Commerce Base," Xinhua, 1/26/16, http://news.xinhuanet.com/english/2016-01/26/c_135046227.htm

9 "Rolls-Royce looks to establish industrial 'ecosystem' in India," by Jon Grevatt, IHS Jane's Defence Industry, 4/12/17, <http://www.janes.com/article/69506/rolls-royce-looks-to-establish-industrial-ecosystem-in-india>

**A BUSINESS ECOSYSTEM IS AN
ECONOMIC COMMUNITY SUPPORTED
BY A FOUNDATION OF INTERACTING
ORGANIZATIONS AND INDIVIDUALS.
— JAMES F. MOORE**



FROM 2006 THROUGH 2015, THE ECONOMIES OF EMERGING AND DEVELOPED ASIA COLLECTIVELY GREW AT AN AVERAGE ANNUAL RATE OF 8%, ACCORDING TO RESEARCHERS AT THE INTERNATIONAL MONETARY FUND

and industry leadership in enterprise blockchain and cognitive technologies.” Of course, the company has a strong self-interest at stake, too. “We want to use our presence in Asia to build upon IBM’s reputation as the cognitive solutions and cloud platform company—to make Watson the artificial-intelligence platform of choice for business, and IBM Cloud the leading B2B platform,” Choy says.

Looking Ahead

For years, Asia has been growing faster than the rest of the world. From 2006 through 2015, for example, the economies of emerging and developed Asia collectively grew at an average annual rate of 8 percent, according to researchers at the International Monetary Fund, compared with an average growth rate of 1.4% for all the world’s advanced economies, 0.7% for the euro area, and 3.8% for the entire world.¹⁰ Companies that have put down roots in Asia don’t expect this growth advantage to disappear anytime soon. Partly as a result, many have come to view the region not only as a breeding ground for innovation but also as a growing and increasingly valuable proving ground for new products, services, and business models.

“We believe Asia will continue to be the fastest-growing region in the world over the next five to 10 years,” says Makino’s Neo. “With a fast-growing and discerning middle-class population, the need for companies to come up with new and innovative products to serve that growing population will be even more accentuated. We have to be ahead of the innovation curve in order to be at the table with our corporate customers as they seek to do this.”

At Merck, Maestre says meeting the challenges of developing sophisticated products that are affordable and workable for developing markets in Asia will create new business opportunities in developed markets, too. “Concepts that can overcome the affordability and availability challenges characteristic of emerging Asia should be easily exported to the developed world,” she says.

Like so many of her peers, Dr. Ee from Evonik sees Asia as critical to her company’s growth, too. “Our aspirations for Asia, coming from the region, are to build our talent capital so that we can create strong next-generation leaders, and have a strong R&D footprint to capture growth and innovation not only for the Asian market but also globally,” she says.

Beyond Asia’s fast-growing economies, business leaders contend it also will remain a center of global innovation. “Korea and Japan are leading the shift to 5G, keeping those countries on the cutting edge of wireless technology,” notes Lemon. “Their automakers are working on self-driving cars, and India is a tremendous source of innovation on digital payment services.”

Micron’s Allan is optimistic about the outlook for Asia, too, and not just in Singapore. “The great story in Singapore will continue,” he says. “I foresee that our center of excellence in our manufacturing headquarters is a great place to be. But we’re also excited about Taiwan, where we’re creating a center of excellence for dynamic random access memory. And while we don’t have much operational presence in China yet, we have great customers there, and we’re very committed to the region. The opportunity to do something similar in China is around the corner.”

For all the positive winds at Asia’s back, business leaders see risks, too, both on the economic front—China is still one of the fastest-growing countries in the world, but has been growing over the past few years at a slower pace—and, in some countries, on the political front.

¹⁰ “World’s GDP Growth by Region 2016,” by Valentina Pasquali, *Global Finance*, 11/12/15, <https://www.gfmag.com/global-data/economic-data/economic-dataworlds-gdp-growth-by-region>

For all the positive winds at Asia's back, **business leaders see risks**, too, both on the economic front and, in some countries, on the political front.

"I think it's a very promising part of the world, with a couple of caveats," says Harvard's McFarlan. "The caveats are the ability to work our way around the North Korea problem and not have some very upsetting events come out of that, and secondly, and more easy to deal with, all the irritation relating to the South China Sea and a more muscular China. I think we work through that, because at this stage China's Navy is still a tiny piece of what ours (U.S. Navy) is, so they're not looking for direct confrontations."

Meanwhile, some naysayers argue that Singapore's startup culture is wholly dependent on the Singapore government's support, and indeed, its startup system is at a nascent stage compared with more established startup cultures in places like Silicon Valley. But supporters counter that government support is critical to getting startup enterprises established in the nation-state.

Labor costs are another concern. At one time, notes Makino's Neo, Asia was renowned for being a low-cost manufacturing hub, due to a ready supply of cheap labor. Today, that labor-cost advantage over the rest of the world is dwindling away as the competition for employees heats up.

Matsuzaka concurs that local labor costs have become higher throughout the ASEAN countries, including in Singapore, which is one reason MCAP is working hard to promote a lean structure and cost optimization. It also is looking to innovations in artificial intelligence and internet of things technology to help drive competitiveness in those markets.

Other companies are working to ensure continued access to a talented workforce in Asia. Rohde & Schwarz, for example, participates in "Poly Goes UAS," an initiative by approximately 1,500 German industrial companies aimed at building engineering talent in Singapore. Under the program, students at polytechnic institutes in Singapore are given an opportunity to earn bachelor's degrees while serving multiple internships with a participating company. "By the time we hire these students, they already know the company's processes and organizational structure," observes Rohde & Schwarz president and chief operating officer, Peter Riedel. More recently, Rohde & Schwarz launched a similar program for students at TUM Asia, a Singapore-based branch of acclaimed German university Technische Universität München. With that program, Rohde & Schwarz offers students who have already earned a bachelor's degree from TUM Asia the opportunity to earn a master's degree at TUM while serving internships with Rohde & Schwarz along the way.

Elsewhere, other companies are hoping that more countries across Asia adopt the educational model of Singapore, which emphasizes not only a traditional university education but also polytechnic and vocational schools.

Of course, companies themselves will bear much of the responsibility for how they, and Asia, perform in the years ahead.

INNOVATIONS EMERGING OUT OF ASIA

Intel Corp.

In 2016, semiconductor pioneer Intel Corp. worked with ConnectedHealth, a Singapore-based startup, to develop a vital-sign monitoring system that allows doctors and caregivers to remotely monitor patients with chronic diseases. Chronic disease management accounts for a huge chunk of healthcare costs, and this system helps reduce them. Sumner Lemon, sales director, Intel Asia-Pacific and Japan, credits Singapore with articulating a vision for how technology can help solve challenges in areas such as healthcare and transportation. "That vision, combined with active industry engagement, a vibrant startup ecosystem, and excellent infrastructure, creates an environment where innovative products and services can be developed, tested, and deployed commercially," Lemon says.

“Looking forward,” Tung predicts, “Singapore will provide the **R&D talent pool** for the whole of Asia and even the world.”

INNOVATIONS EMERGING OUT OF ASIA

Rohde & Schwarz GmbH & Co.

Germany’s Rohde & Schwarz GmbH & Co., a maker of electronic test and measurement equipment, just this year introduced a new series of power supplies, developed by its R&D team in Singapore, that offers a number of features not typically found in devices in their class. Rohde & Schwarz President and Chief Operating Officer Peter Riedel credits Singapore for offering “a good base for building our talent pool” and allowing the company to gather expertise both locally and globally. He adds that Singapore’s strong intellectual property protections also support the company’s development of products for the Asian market. “Finally,” he says, “we have been obtaining great support from Singapore’s Economic Development Board, which has been pivotal in the expansion and coverage of our R&D efforts in Singapore.”

“Real innovation is vital and necessary to Asia’s future, but we should be careful not to treat an ‘innovation hub’ as some magic center and believe something will happen if we simply open a center with the word innovation on it,” says Evonik’s Ee. “Investing in innovation hubs can be regarded as lubricating the flow of ideas in and out of Asia. The key challenge will be the hubs’ ability to generate commercial results in a timely manner that have sustainable business impact.”

3M’s Tung, for one, is confident Asia and industry alike will be up to the task, and that Singapore in particular will play a vital role in its growth.

“We foresee a positive outlook for innovation hubs in Asia,” he says, “especially for those set up to address current and emerging trends in the region.” Tung notes that 3M first started R&D operations in Singapore in 1994. Its latest significant investment was its Smart Urban Solutions Lab in October 2015, which aims to tackle the urbanization-related issues faced by most major cities across the region.

“Looking forward,” Tung predicts, “Singapore will provide the R&D talent pool for the whole of Asia and even the world. With strong backgrounds and experience in smart cities, green technologies, and project management, the Singapore R&D community is well-positioned to expand its influence and power to improve people’s lives all around the world.”

With so many factors working to its advantage—headlined by fast-growing economies, government support, an educated workforce, and rich technology ecosystems—Asia appears well-positioned to continue its role as an innovation incubator and an important market for new products, services, and business models.



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